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July 1981

COMPLETED

Atlas of Coal/Minerals and Important Resource Problem Areas for Fish and Wildlife in the Conterminous United States

Oak Ridge National Laboratory

Fish and Wildlife Service

U.S. Department of the Interior

The Biological Services Program was established within the U.S. Fish and Wildlife Service to supply scientific information and methodologies on key environmental issues that impact fish and wildlife resources and their supporting ecosystems.

Projects have been initiated in the following areas: coal extraction and conversion, power plants, mineral development, water resource analysis, including stream alterations, and western water allocation, coastal ecosystems and Outer Continental Shelf development, environmental contaminants, National Wetland Inventory, habitat classification and evaluation, inventory and data management systems, and information management.

The Biological Services Program consists of the Office of Biological Services in Washington, D.C., which is responsible for overall planning and management; National Teams, which provide the Program's central scientific and technical expertise and arrange for development of information and technology by contracting with States, universities, consulting firms, and others; Regional Teams, which [illegible] local expertise and are an important link between the National Teams and the problems at the operating level; and staff at certain Fish and Wildlife Service research facilities, who conduct inhouse research studies.

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July 1981

ATLAS OF COAL/MINERALS AND IMPORTANT RESOURCE PROBLEM AREAS FOR FISH AND WILDLIFE IN THE CONTERMINOUS UNITED STATES

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PREFACE

The need for an appropriate balance between coal and minerals development activities and fish and wildlife resources has never been greater. Americans are aware of the urgent need for greater productivity from existing mines and the need to rapidly develop new mines. On the other hand it is our intent to protect the current stock of biological resources and where possible to create new habitat for fish and wildlife through sound planning for mine land reclamation. However, for many administrators and scientists, little consolidated information specifically related to fish and wildlife concerns is available for use in national and regional planning for development of mineral extraction facilities.

Beginning in early 1980, the Eastern Energy and Land Use Team, Office of Biological Services, U.S. Fish and Wildlife Service, in cooperation with Oak Ridge National Laboratory (Department of Energy), initiated development of this atlas depicting the Fish and Wildlife Service's Important Resource Problem Areas (IRPs) and 12 important mineral commodities. The information, presented on 20 semi-transparent maps and in this accompanying descriptive text, should be especially useful to administrators at national and regional planning levels. The Atlas will facilitate recognition of desired balanced objectives for fish and wildlife and mineral resources.

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SUMMARY

This atlas highlights areas in the conterminous United States of potential concern involving coal and minerals development activities and fish and wildlife resources, in particular the Important Resource Problem Areas (IRPs) designated in 1980 by the U.S. Fish and Wildlife Service (FWS) as areas of emphasis in policy making. National and regional administrators and planners have need of such information due to several national, state, and local laws which currently require landowners to minimize disturbances and adverse impacts on fish and wildlife resources and protect and enhance these resources where practicable. This atlas serves as an initial screening tool for planners and administrators to help define areas that may require further analysis prior to development.

The atlas consists of two parts. The first part is a series of twenty 1:7,500,000-scale county-level resolution maps of the conterminous United States that depict deposits of selected mineral resources (coal, copper, geothermal resources, gold, iron, molybdenum, nickel, oil shale/tar sands, peat, phosphate, silver, and uranium), FWS IRPs, Federal Endangered and Threatened Animal Species, and county names. By overlaying a wildlife map onto a mineral map, counties containing both mineral and wildlife resources will be highlighted, thus serving as an initial screening tool to help define areas of concern. The maps can also be used with a variety of other 1:7,500,000-scale maps, such as those in The National Atlas of the United States of America (USGS 1970). The second part of the atlas is a text that serves to orient the reader as to the use of the 20 maps and contains background information on IRPs, the mineral commodities, and environmental impacts of mineral mining activities, as well as appendices that tabulate the information found in the 20 maps.

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ABBREVIATIONS

FWS	U.S. Fish and Wildlife Service (Department of the Interior)
IRP	Important Resource Problem
NAS	National Academy of Sciences
USBOM	U.S. Bureau of Mines (Department of the Interior)
USDOC	U.S. Department of Commerce
USDOE	U.S. Department of Energy
USFS	U.S. Forest Service (Department of Agriculture)
USGS	U.S. Geological Survey (Department of the Interior)
USWRC	U.S. Water Resources Council

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Robert A. Honig performed work on this atlas in part while serving on a Cooperative Ecological Internship with the Institute of Ecology, Butler University, Indianapolis, Indiana 46208.

INTRODUCTION

Approximately 1.5 million hectares (3.7 million acres) of land in the United States have been disturbed by surface mining between 1930 and 1971 (Paone et al. 1974). This extensive area indicates that potentially serious problems exist for fish and wildlife populations on these lands. In addition, underground mining causes untold impacts to off-site lands and ground water resources. Whether the disturbance is localized or widespread, the total effect is to reduce the amount of available habitat for fish and wildlife and often to render the land and water unfit for healthy, productive fish and wildlife populations. Thus, administrators and regional planners have a need for information that documents areas of possible concern due to coincidence of minerals development activities and fish and wildlife resources. With impending new exploration and mining to supplement future strategic and critical mineral resource needs (Terrell 1980), broad scale planning tools, such as this atlas, will be of increasing use for years to come.

This atlas of fish and wildlife Important Resource Problem areas (IRPs) and 12 selected mineral commodities provides national and regional administrators and scientists with a ready reference document for land use planning purposes. The U.S. Fish and Wildlife Service (FWS) recognized 78 IRPs (Appendix A) as of June 1980. These IRPs, each assigned a given rank from 1 to 78, are described in the U.S. Fish and Wildlife Service IRP Source Document (FWS 1980b) and are depicted in a generalized map of the United States (including Alaska, Hawaii, Puerto Rico, and the Virgin Islands)(FWS 1980a). To date however, no published information on IRPs includes the particular counties involved (highly important to national and regional planners), and available maps are not drawn in a commonly used scale (e.g. 1:7,500,000). Also, various categories of fish and wildlife (fish, amphibians, reptiles, birds, mammals, and invertebrates) and threatened and endangered species are not mapped. Therefore, it is difficult to define possible areas of concern where mineral commodity developments may impact fish and wildlife habitat.

To depict counties of interest, data for the mineral resources, IRPs, and threatened and endangered species in the 48 conterminous United States were compiled into the Geoecology Data Base (Olson et al. 1980) at Oak Ridge National Laboratory, Oak Ridge, Tennessee (the Geoecology Data Base does not include Alaska, Hawaii, and U.S. territories; thus the scope of this atlas is limited to the conterminous United States). The use of this data base in conjunction with a computer mapping program (Coleman 1978) resulted in the generation of county level maps. Maps of the IRPs and the mineral commodities provide the national and regional planner with an easy to use representation of the data that can be overlaid in any desired fashion to assist in identifying areas of concern. This will help achieve the desired balance between fish and wildlife habitat preservation and needed mineral development projects.

The need for the kind of data presented in this atlas resulted from several national, state, and local laws dealing with fish and wildlife protection and enhancement in relation to surface mining. The "Surface Mining Control and Reclamation Act of 1977" (SMCRA), Public Law 95-87, and its supporting Regulations (March 1979) emphasize the need to minimize surface mining impacts to fish and wildlife populations and to return the reclaimed habitat to productive uses, including fish and wildlife habitat among the alternatives. Enhancement of fish and wildlife habitat and protection of the biota before and during mining and consideration of post-mining reclamation also are addressed in the Act. Several sections of the Regulations of SMCRA that concern fish and wildlife were remanded by Federal District Court, and thus reference to these sections is inappropriate at this time. However, it is well documented that the mining industry and states have supported enhancement of fish and wildlife on mined lands where possible; and there are already many surface mining programs which benefit fish and wildlife.

In addition to SMCRA, there are other noteworthy federal and state laws relating to surface mining of minerals. For example, pursuant to the Mineral Leasing Act of 1920, the U.S. Forest Service is responsible for leasing and land management of National Forest lands (Plantico, in prep.); and -- within the U.S. Department of the Interior -- the National Park Service, the Bureau of Land Management, and the Geological Survey participate in lease management, pursuant to the same law. The Bureau of Land Management administers public mineral resources through several laws. The U.S. Army Corps of Engineers and U.S. Environmental Protection Agency administer dredge and fill and water quality and quantity permits relating to surface mining. State programs have been established to enforce and monitor surface mining discharges. The U.S. Fish and Wildlife Service, in addition to advising the above agencies, manages land incorporated into the National Wildlife Refuge System. Unlike the western United States, where much of the land used for mineral development is administered by federal agencies, most mining in the eastern United States is on private lands under the regulation of state and local laws. Detailed discussion of federal and state laws involving fish and wildlife resources are contained in several documents (e.g. Plantico, in prep.) and numerous documents available from the various agencies.

ATLAS MAPS

The atlas consists of two parts: a series of twenty 1:7,500,000-scale maps; and this text which serves to orient the user to the 20 maps. The twenty 1:7,500,000-scale maps (Table 1) portray, on a county level of resolution, distributions of selected mineral resources (Maps 1-12) and fish and wildlife resources (Important Resource Problems, Maps 13-18; and Federal Endangered and Threatened Animal Species, Map 19), with Map 20 identifying county names. Areas of overlap between a wildlife resource and a mineral resource will be highlighted by overlaying a wildlife map onto a mineral map, or vice versa (or by overlaying the Important Resource Problem Area transparency, supplied inside the back cover of this document, onto Figures 4-15). Thus the maps serve as an intitial screening tool for planners and administrators to help define areas that may require further analysis prior to development.

Table 1. Titles of 1:7,500,000-scale national maps.

No.	Title
1*	Coal Reserves
2*	Copper Deposits
3*	Geothermal Resources
4*	Gold Deposits
5*	Iron Deposits
6*	Molybdenum Deposits
7*	Nickel Deposits
8*	Oil Shale and Tar Sands Deposits
9*	Peatlands
10*	Phosphate Deposits
11*	Silver Deposits
12*	Uranium Deposits
13*	FWS Important Resource Problem Areas
14	FWS Important Resource Problem Areas, Birds
15	FWS Important Resource Problem Areas, Fish
16	FWS Important Resource Problem Areas, Invertebrates
17	FWS Important Resource Problem Areas, Amphibians and Reptiles
18	FWS Important Resource Problem Areas, Mammals
19*	Federal Endangered and Threatened Animal Species
20	County Names

* Maps also contained in this text.

Counties were chosen as well-defined geopolitical units and are particularly relevant because many planning and permitting processes occur at that level of government. Counties also serve as spatial units for many data files and can be easily mapped with computer programs. Unfortunately the large size of some counties, especially in the west, can give a distorted visual impression of some parameters. Most of the maps indicate simply the presence or absence of an attribute within counties. Therefore, even if the occurrence of an attribute is restricted to a small portion of a county, the map may give the impression of a much larger occurrence. However, many of the attributes, such as species' ranges or peat deposits, are not well defined. Thus a county-level distribution may very well represent a good approximation of these distributions. Nevertheless, as a result of these factors, care should be taken in making specific interpretations from the maps.

There are 3,071 county units in the conterminous United States as defined in this study. Map 20 identifies county names for the conterminous United States. Appendix C contains these county names in addition to Federal Information Processing Standards (FIPS) codes (USDOC 1973). These codes are generally odd numbers assigned sequentially to counties arranged alphabetically within a state. Also in Appendix C are listed the IRP's and minerals occurring within each county. Yellowstone National Park was excluded from the maps since it is a separate county unit exempt from minerals exploitation. The maps were generated with the EZMAP program (Coleman 1978) developed by the Geographic Systems Group for use at Oak Ridge National Laboratory. The IRP and minerals data files were added to the Oak Ridge National Laboratory Geoecology Data Base (Olson et al. 1980) which contains extensive county-level data for environmental attributes in the conterminous United States. These paramenters include endangered and threatened species, bird and mammal distributions, vegetation, forestry, agriculture, terrain, climate, and land use. Therefore, additional environmental parameters can be easily integrated into future studies to investigate habitat characteristics of each IRP and potential effects of minerals exploitation.

The use of 1:7,500,000 scale maps permits comparison with numerous other maps that are available at that scale. Examples of such maps are: Water Resources Aggregated Subregions (USWRC 1977); Ecoregions of the United States (Bailey 1976); Ecosystems of the United States (USFS 1978); and many maps in The National Atlas of the United States of America (USGS 1970), including maps concerned with landforms, soils, vegetation, surface and ground water, forest types, land use, minerals, population, federal lands, and many other subjects.

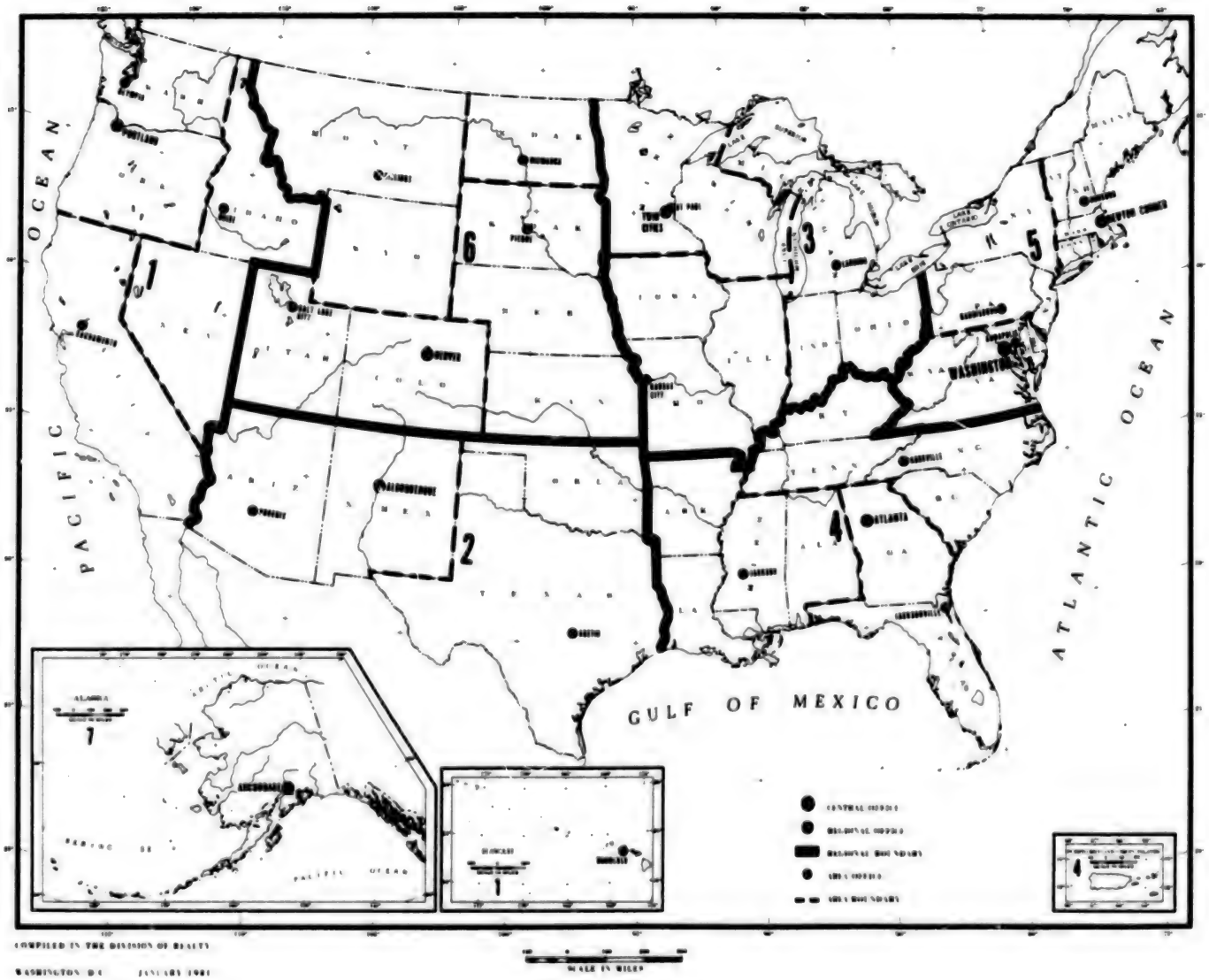

Figure 1. U.S. Fish and Wildlife Service Regions.

IMPORTANT RESOURCE PROBLEMS (IRPs)

In September 1979, the U.S. Fish and Wildlife Service (FWS) of the Department of the Interior developed the concept of National Important Resource Problems (IRPs). IRPs are simply defined as those fish and wildlife resources having significant problems in specific geographic areas. Each IRP indicates that a certain species or community of species in a given area is or will be under significant stress. This represented a coordinated attempt to identify program priorities so that FWS efforts can be focused on areas of critical need. The IRP concept is not by any means intended to be an exclusive statement of FWS Habitat Preservation activities, but rather to define areas of emphasis for FWS activities (FWS 1980a, 1980b).

On the basis of a series of ranking factors, FWS assigned priorities to 70 IRPs nationwide. This list was revised in June 1980 to a total of 78 IRPs (Appendix A). The nationally ranked list was formulated from a larger group of IRP proposals determined by the seven FWS Regions (Figure 1) and FWS Research Division. Most IRPs involve aspects of habitat such as physical destruction, chemical contamination, and/or reduction in water quantity and/or quality (FWS 1980a). The key ranking factors included (FWS 1980b):

* Current status of population;
* Current status of habitat (of target species);
* FWS responsibilities for protection, management, or restoration of the resource;
* Resource value to humans (e.g., recreational or commercial benefits);
* Magnitude of potential loss;
* Immediacy of threat;
* Desired objective for IRP (i.e., desired quantity or quality of species population or human use levels).

Thus, the priority ranking of the IRPs reflects their perceived importance in terms of the fish and wildlife resources for which FWS has a responsibility (FWS 1980b). Continuing reviews and updates will improve the validity and precision of the work.

Of the 78 IRPs, 63 are located within the 48 conterminous United States. Four of these -- acid rain, lead poisoning in migratory birds due to use of lead shot by hunters, migratory bird diseases (avian cholera and duck virus enteritis or DVE), and impacts of exotic fish on native endangered fish species -- are national in scope and not relevant to problems resulting from mining activities. Thus, 59 IRPs are within the scope of this atlas.

Maps 13-18 (Figure 2). Geographical distributions of the IRPs at county-level resolution were determined from FWS maps (FWS 1980b) by noting all counties that are totally or partially occupied by an IRP. For IRPs that are primarily concerned with rivers, counties on both river banks are included; adjacent shoreline counties are included for open water IRPs (e.g., Great Lakes, oceans, Gulf of Mexico). Concurrence with these distributions was provided by FWS Regional Offices and FWS Research Division.

Map 13 (and Figure 2) is a composite county-level map of IRPs in the 48 conterminous United States; a transparency of Figure 2 is provided for use as an overlay with the other maps (Figures 1, 3-15) in this text. Maps 14-18 are concerned with single major groups of animal species associated with the IRPs (see Table 1) and are not reproduced in this text. IRPs are listed by associated animal type in Appendix B. Appendix C lists all counties in the conterminous United States along with associated IRPs and minerals.

It should be noted that the FWS Headquarters, Washington, D.C., has issued a set of 8½" X 11" IRP maps, which were prepared for general national and regional planning. These 8½" x 11" maps are not as accurate as the IRP maps contained in this atlas, which have been reviewed by the FWS Regional Offices and contain more detail.

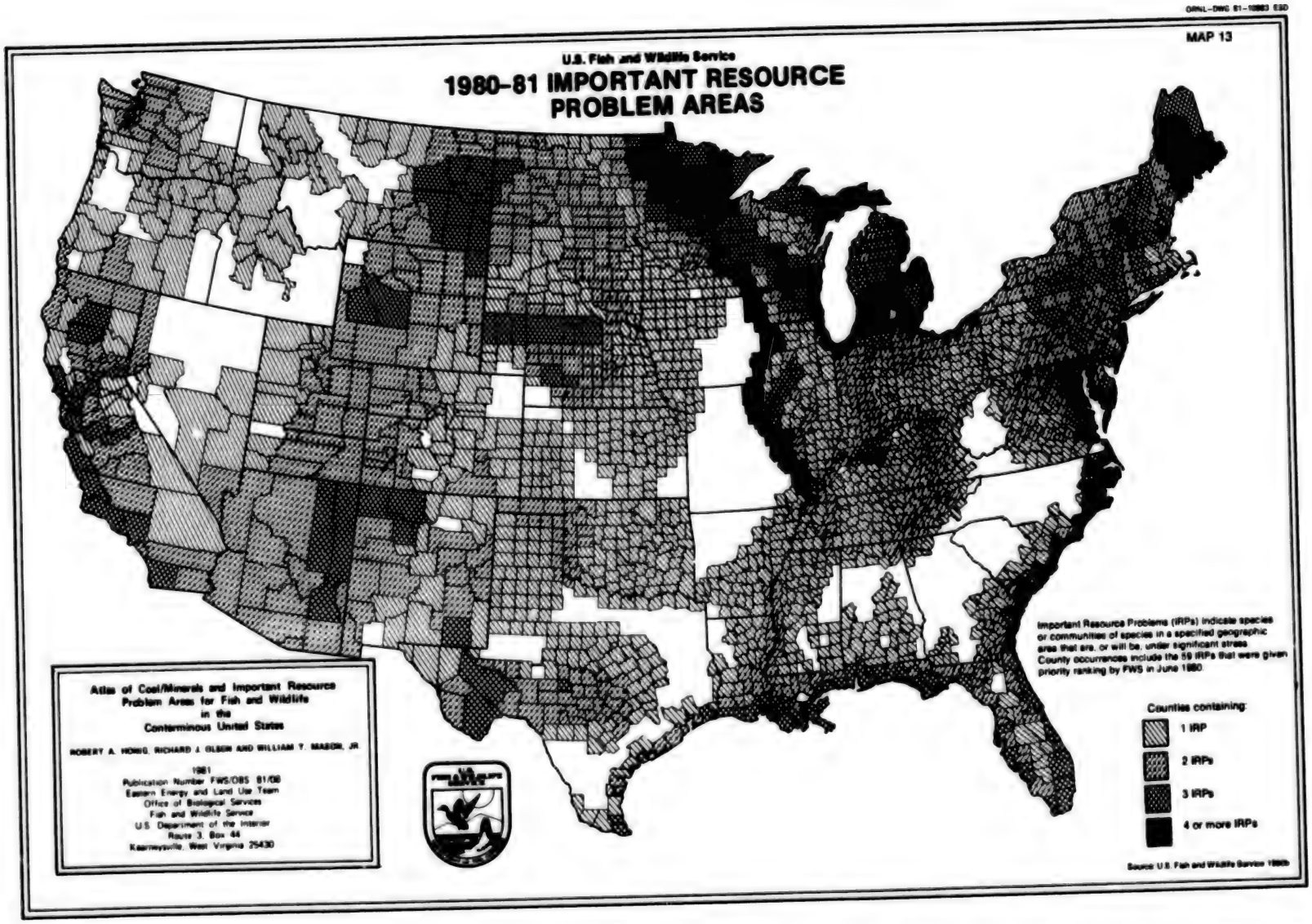

Figure 2. County-level distribution of U. S. Fish and Wildlife Service Priority IRPs (determined June 1980) in the conterminous United States. Nationwide IRPs are not illustrated (see text). A transparent reproduction of this map is included inside the back cover of this document. It can be used to overlay each mineral commodity map (Figures 4-15) to highlight areas of potential concern due to coincidence of IRP and mineral distributions.

ENDANGERED AND THREATENED ANIMAL SPECIES

The present listing of endangered and threatened species is a result of the Endangered Species Act of 1973, Public Law 93-205. This act provides for the conservation of endangered (in danger of extinction) and threatened (those not presently in danger of extinction but likely to become so) species of fish, wildlife, and plants by federal action and by encouraging the development of state programs. The Act authorizes determination and listing of endangered and threatened species (including foreign species) and the portion of their ranges where such status exists; prohibits unauthorized taking, possession, sale, transport, importing, etc., of endangered species; authorizes acquisition of land for the conservation of listed species with land and water conservation funds; and authorizes the assessment of civil and criminal penalties for violating the Act or regulations (FWS 1979; Clark 1979). In addition, Section 7 of the Endangered Species Act requires that any federal action not jeopardize the existence of listed species nor modify their critical habitat. In November 1978, Public Law 95-632 made extensive revisions to the 1973 Act. Among these revisions was establishment of a process whereby federal agencies may obtain an exemption from the requirements of Section 7 (FWS 1979). The most recent listing of federal endangered and threatened animal species was published on May 20, 1980 (FWS 1980c).

Map 19 (Figure 3). Federal endangered and threatened animal species distribution data for the conterminous United States were compiled from the United States Endangered Species Distribution file (Nagy and Calef 1979). The distribution depicted on Map 19 reflects the May 20, 1980, listing of federal endangered and threatened animal species (FWS 1980c).

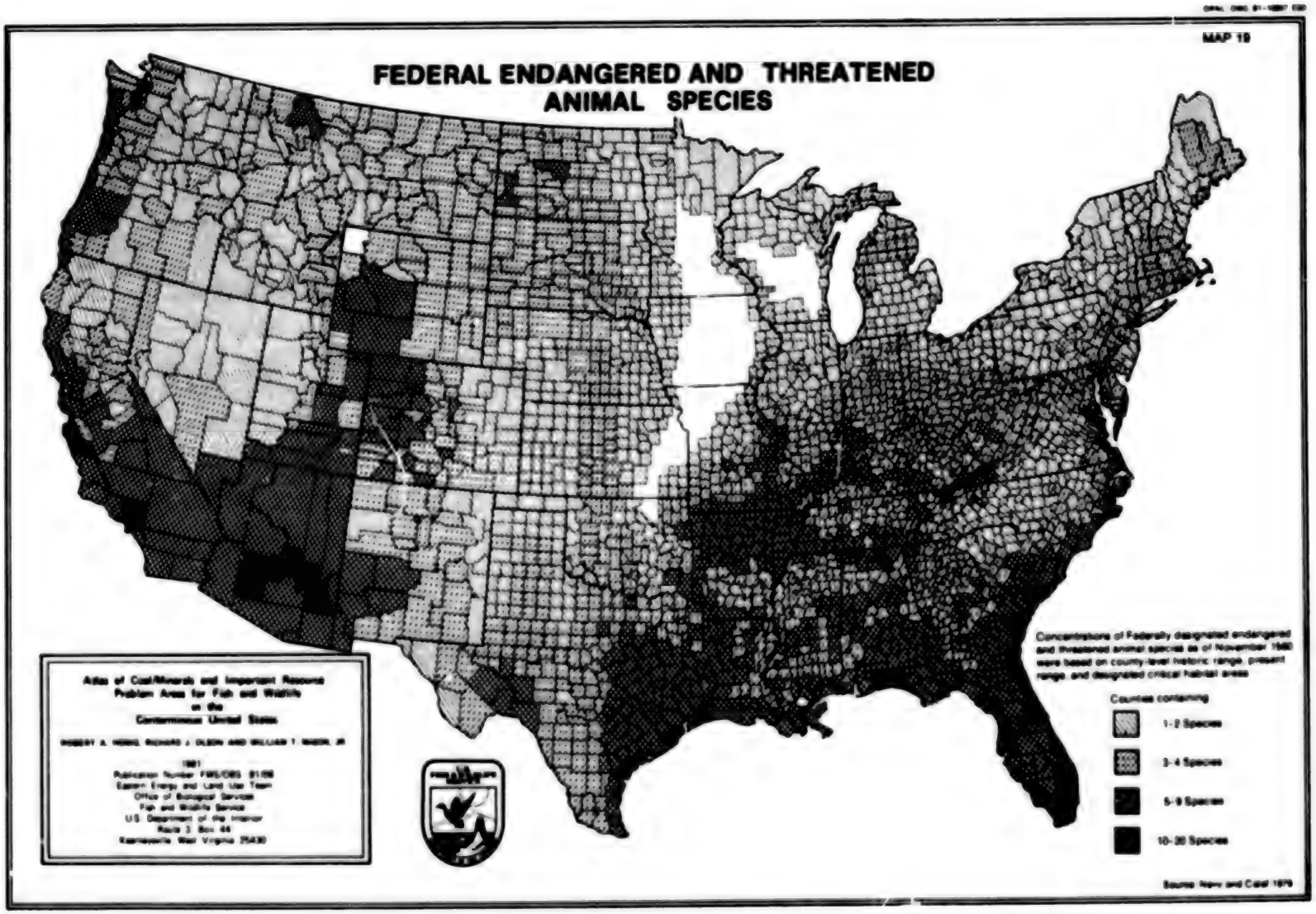

Figure 3. Concentrations of federal endangered and threatened animal species.

MINERAL RESOURCES AND ENVIRONMENTAL IMPACTS OF MINING ACTIVITIES

Sixteen mineral commodities were chosen for inclusion in the atlas. These commodities were chosen because: (1) they were emphasized, because of their long-range importance to fish and wildlife habitat, by the Minerals Project, Office of Biological Services, U.S. Fish and Wildlife Service, Washington, DC; and/or (2) they are of considerable economic importance; and (3) data bases containing information concerning their distribution were readily available. County-level distributions of 12 of these commodities -- coal, copper, geothermal resources, gold, iron, molybdenum, nickel, oil shale/tar sands, peat, phosphate, silver, and uranium -- are depicted on Maps 1-12. The selection of only 12 minerals for mapping was based largely on the existing data bases showing reserves by county, and on funding limitations. The other four commodities -- kaolin, limestone and dolomite, sand and gravel, and zinc -- are treated only in the text.

* * *

Degradation of wildlife habitat is a common effect of mining. Disturbances can be caused by intrusions of man, vehicles and machines, odor, and noise. Deterioration of habitat may result from a combination of factors including: destruction of wetlands; increased stream sedimentation due to erosion; chemical water pollution; stream channelization and altered flood drainage; destruction of vegetation and other terrestrial habitats; and air emissions. However, after reclamation, an area may potentially have an increased carrying capacity for wildlife, especially if revegetated with mixed plant types; and surface mine lakes may provide new habitat for waterfowl and other aquatic species (NAS 1979).

This document is concerned with the location of minerals deposits and possible mining activities. Processing and transportation of minerals are not treated specifically. Specific environmental impacts associated with the mining of a particular mineral are described in the section concerning that mineral.

Certain environmental impacts are typically associated with surface and underground mining methods used for a wide variety of minerals. Mining impacts can be classified as either primary or secondary. Primary impacts are directly a result of mining activity, for example: excavation; creation of lagoons; road and facility construction; ground subsidence; gaseous emissions; dust; erosion; runoff of sediments; and chemical pollution of ground and surface waters. These can cause direct mortality, displacement of wildlife, and/or failure of wildlife to compete successfully if displaced. Secondary impacts result from the influx of people into formerly undisturbed areas. In many cases, the increased population results in urbanization, industrialization, agriculture/grazing, and recreation; these in turn can result in pollution, harassment of wildlife, and road and traffic hazards. These developments potentially can have a greater impact than the primary impacts (Horak and Olson 1980), however it is the primary impacts that will be addressed in this section.

The principal effects of mine exploration result from access roads, drill pads, and small excavations made to hold drilling fluid. More drilling, tunnelling, or shaft sinking may be done if initial prospecting is favorable. Typically, the area disturbed by a single drill site is approximately one-half of an acre, and also may include scrapings on a slope as a level site is needed. In addition drilling without proper aquifer sealing can result in the mingling of ground waters from different aquifers (NAS 1979).

A major impact of mining operations is disturbance of the land surface, especially in surface mining operations which, more than most other land uses, irreversibly change the land they occupy (NAS 1979). Surface mining, which has disturbed about 0.12% of the land surface in the the 48 conterminous states (NAS 1979), completely and dramatically destroys the existing natural communities. As a result it may be difficult if not impossible to fully restore the original contour, productivity, native vegetation, and utility to wildlife of a surface-mined area (Reznek 1977). Furthermore, reclamation of non-coal surface mines is still relatively limited, but activity is increasing as state laws come into effect (NAS 1979). Even underground mines can degrade the land surface as a result of ground subsidence and waste disposal. The amounts of land surface utilized and reclaimed by the mining industry from 1930 to 1971 are summarized in Table 2. Much of the land defined as disturbed is part of existing operations and cannot be reclaimed until mining is completed. Also, land disturbed by mineral exploration, access and haulage roads, and mills and camp sites is not included in Table 2, but this would increase the total by a maximum of only 5-10%.

The effects of surface mining on land use and landscape vary with: terrain; depth, size, and shape of the ore body; and waste/ore ratio. Removal of overburden and waste to expose the ore body and maintain safe pit slopes requires surface storage or disposal of soil and waste. Vegetation is destroyed in the pit, storage/disposal areas, and support facilities areas. Occasionally, as in sequential mining of contiguous ore bodies, a worked-out pit may be conveniently available for storage of waste from an operating pit. However, even with contiguous ore

Table 2. Approximate areas (hectares) of land utilized and reclaimed by mining activities[1] in the 48 conterminous United States, 1930-1971 (from Paone et al. 1974).

Type of use	Utilized	Reclaimed
Surface area mined (area of excavation only)	866,000	396,000
Area used for disposal of overburden and other mine waste from surface mining ..	295,000	162,000
Surface area subsided or disturbed as a result of underground workings	42,500	2,380
Surface area used for disposal of underground mine waste	76,700	8,740
Surface area used for disposal of mill processing waste	182,000	18,700
Total[2]	1,470,000	587,000

[1] Excludes oil and gas operations.
[2] Data may not add to totals shown because of independent rounding.

bodies, sequential pit opening may not be feasible because the necessity for ore grade control and resource conservation requires mining from selected parts of one or several bodies simultaneously (e.g., berrylium, clay, cement, uranium) (NAS 1979).

The primary effects of underground mining are surface subsidence and destruction of vegetation and terrain alteration by roads, support facilities, and mine waste storage. Ground collapse may be part of a planned block-caving operation, or it may occur after the completion of mining due to failure of underground support. Subsidence in level terrain is more defacing than in mountainous or rugged terrain, and it may damage roads and other structures wherever it occurs (NAS 1979).

Water management is a critical issue in the reclamation of mined land. In the west, reclamation of the land surface is especially difficult because of water availability problems. In such arid ecosystems, revegetation can occur only over very long periods of time. Several western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, Wyoming [USGS 1970]) have areas that receive less than the 10-inch minimum average annual precipitation required for successful revegetation. In other states, severe seasonal variation in precipitation severely limits revegetation during parts of the year. Irrigation can help but removes water from other uses (Reznek 1977).

Mining activities can have serious effects on surface and ground water resources. The potential for damage is especially severe where there is extensive exposure of ore and wall rock to an oxidizing and humid (or wet) environment. These conditions promote the formation of acids and the solubilization of metals and other chemicals. Measures to limit water entry into underground mines may fail after mining ceases, and subsidence may provide new sources of water entry. Also, improperly plugged boreholes may contribute to ground water pollution and allow inter-aquifer communication. Thus, a mine must be appropriately designed and properly operated and closed in order to minimize water quality degradation (NAS 1979). Furthermore, dewatering of mines may lower water tables, which in turn may eliminate springs and deprive vegetation of water (Horak and Olson 1980). Increased erosion due to destruction of vegetation can result in heavy siltation in surface waters; this in turn can have drastic effects on aquatic life. Finally, tailings ponds may contain toxic pollutants and oily scums that are hazards to wildlife, especially migrating waterfowl (NAS 1979).

Mining activity can also degrade air quality, primarily due to dust from roads, mine-waste piles, and pit operation, and exhaust fumes from equipment and vehicular traffic (NAS 1979).

Another potential consequence of mining is radioactive contamination. Whether this is a real threat is unknown, but radioactive emissions can occur from uranium and, to a lesser extent, phosphate mines (NAS 1979).

The timing of mining activities can influence the severity of environmental impacts. For example, at certain seasons, mining may be more likely to interfere with resting birds or the spawning of fish (Horak and Olson 1980).

Another aspect of the impact of a surface mine is simply from its presence amid neighboring, competing, and commonly incompatible land uses. The degree to which mines are, or could be, isloated by planning and zoning depends upon how large a

share of the nation's land the industry requires and where the mines are located. Location in the natural resource and settlement pattern is important as it affects not only the nature of environmental control measures necessary when a mine is operating, but also the extent to which the land will be needed for other uses when it is no longer mined (NAS 1979). To quote Dick and Wimpfen (1980): "Obviously no mining system is acceptable that unduly jeopardizes the safety or health of the miners or unduly degrades the environment or both." Clearly, every mining operation will cause some degree of environmental degradation. What must be determined is whether that degradation is significant and thus unacceptable, or if it can be mitigated by sound advance planning.

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Coal

Coal is the compressed and altered residue of plants that grew in ancient freshwater and brackish-water swamps. Accumulated plant remains first became peat and were than transformed into coal via diagenesis followed by metamorphism. Of coal consumed annually in the United States, about 62% is used in the production of electricity, 20% is used by the steel industry, and 16% is used by the manufacturing industry (Brobst and Pratt 1973). Coal also has a great potential for use as a raw material in the production of synthetic gas, liquid fuel, and lubricants (Brobst and Pratt 1973; USBOM 1976).

In ascending order of rank (fuel quality), coals are classified as lignite, subbituminous, bituminous, and anthracite. Rank increases as amount of fixed carbon increases and amounts of moisture and volatile matter decrease. Bituminous coal is the most abundant and widespread rank of coal in the United States. Except for some mine rock and anthracite ash, which have been used in the manufacture of lightweight building aggregates, there are no important byproducts or coproducts from the mining and use of anthracite. The carbonization of the other ranks of coal produce three basic coal chemicals -- ammonia, light oil, and tar. Ammonia can be recovered as an aqueous solution or reacted to form ammonia compounds. Coal tar can be processed further to obtain phenols, cresols, naphthalene, and pitch, while the fractional distillation of light oil yields benzene, toluene, xylenes, and solvent naphtha. Some fly ash and bottom ash from burning of coal are also used in manufacture of bricks and lightweight aggregate, and some boiler slag is used in road-building materials (USBOM 1976).

The total domestic production of coal in 1978 was approximately 659 million tons, of which about 654 million tons were bituminous and lignitic coals and about 5 million tons were anthracitic coals (Anon. 1980). As of 1977, 97% of active coal mines in the United States were in 11 eastern states (FWS 1977a). All anthracite production in the United States came from 11 counties in northeastern Pennsylvania. Identified Pennsylvania anthracite resources, representing about 96% of total domestic anthracite resources, were estimated to be 18.6 billion tons as of 1974; 7.1 billion tons of these resources are considered to be mineable by conventional surface and underground methods, with a recoverability of between 40% and 90%. Only 90 million tons of anthracite are in deposits that can be strip mined. Demonstrated domestic reserves of bituminous and subbituminous coals are 293 billion tons of underground deposits and 109 billion tons of surface-mineable deposits (USBOM 1976). Strip mining can obtain essentially 100% of coal in place, while underground mining on the average recovers approximately 50%. However, if only half of the estimated total reserves is recovered, the amount of energy available from coal is still enormously greater than the total available from oil and gas (NAS 1975). Other resources, which are not presently economically recoverable, are estimated to be approximately 3.5 trillion tons of all ranks of coal (USBOM 1976). About 50% to 70% of the U.S. coal resources are located in the Northern Great Plains and Rocky Mountain Coal Provinces, especially in Wyoming, South Dakota, North Dakota, and Montana (Reznek 1977).

Serious environmental problems have faced and will continue to face the development of coal resources. These factors are especially serious to the anthracite industry, which has already suffered a decline as a result of increased costs due to unfavorable geological and other physical conditions (Horak and Olson 1980). Among these environmental impacts are land surface subsidence from underground mining operations and pollution of ground and surface waters by mine drainage (USBOM 1976).

However, the central issue of surface coal mining is environmental aesthetics. Since the use of coal is predicted to double or triple by the year 2000, there is a great potential for the disturbance of a vast amount of land. For example, in the eight-state Western Coal Province (Arizona, New Mexico, Utah, Colorado, Montana, Wyoming, North Dakota, and South Dakota), 43% of the coal is within 225 feet of the surface, and thus surface mining methods can be applied (Reznek 1977). By 2000, strip mining for coal is expected to impact more than 8 million hectares (approximately 20 million acres) across the United States (Horak and Olson 1980).

Map 1 (Figure 4). Estimates of coal reserves were obtained from a U.S. Geological Survey data base (Hamilton et al. 1975; Thomson and York 1975). The file contains tonnages of coal compiled by county and coalbed. Sulfur, ash, BTU, and other properties are given for each coalbed. The coalbeds were aggregated to county units and the relative amount of coal reserves was classified as small (less than 1,000 tons), medium (1,000 to 100,000 tons), or large (more than 100,000 tons).

Other areas in the southeastern United States containing coal reserves of concern to FWS were defined on the basis of information provided by the FWS Regional Office in Atlanta, Georgia (Ronald J. Haynes, pers. comm.). These areas primarily contain lignite reserves.

Additional counties in Indiana and Missouri containing coal deposits of concern to FWS but not shown on Map 1 are listed in Appendix C (R. Welford, FWS, Twin Cities, MN, pers. comm.).

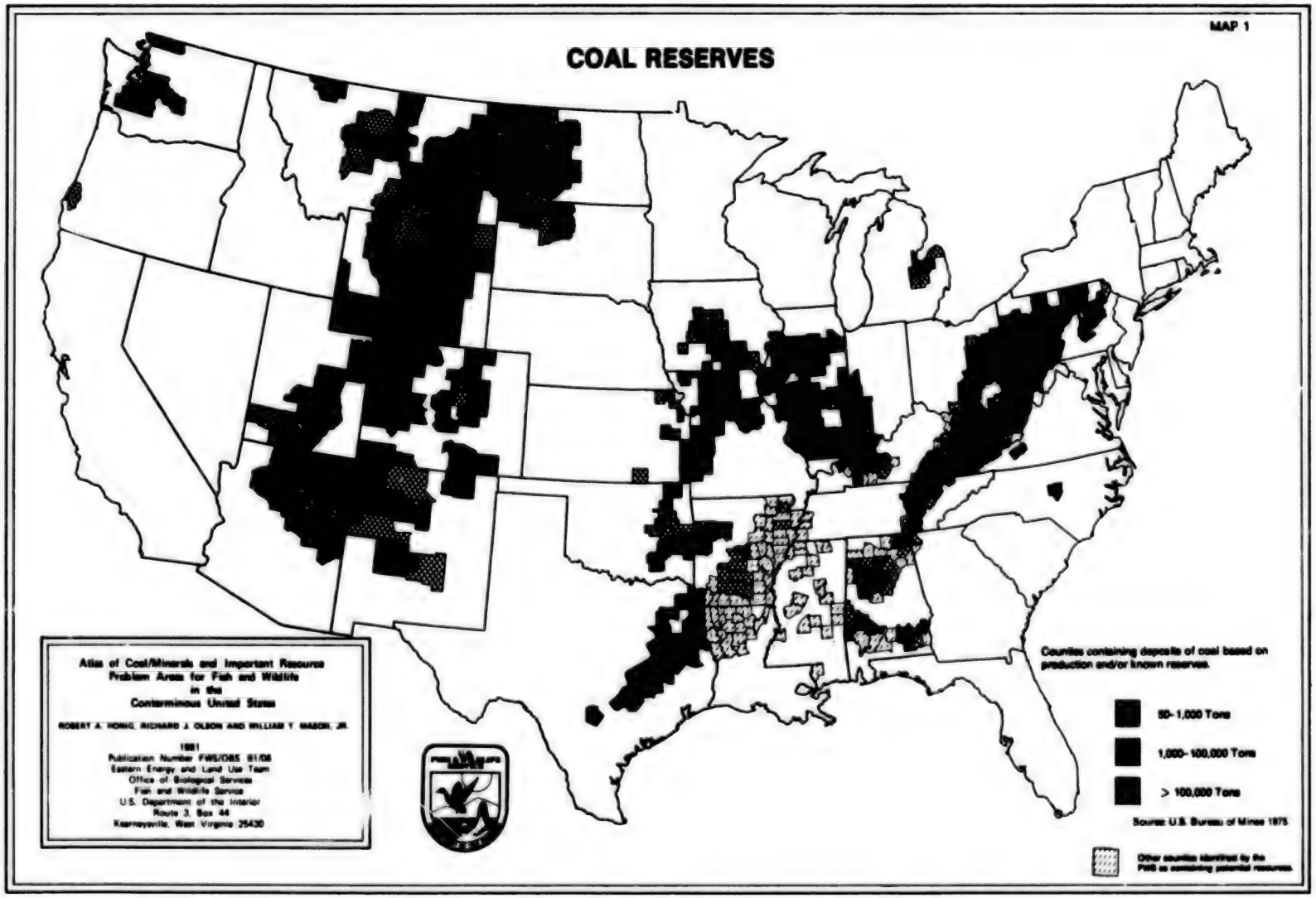

Figure 4. Counties containing coal reserves.

Copper

Copper is utilized in its pure metallic state and in alloys with other metals. It has high electrical and thermal conductivity, ductility, malleability, resistance to corrosion, strength, and lack of magnetism. As such, it is put to innumerable industrial uses. About half of the domestic copper use in 1970 was for electrical applications. Other major uses were in construction, industrial machinery, transportation, and ordnance. If it were not for the increasing substitution of aluminum, and to a lesser extent stainless steel, for copper in numerous applications, the need for copper would exceed its available supply (Brobst and Pratt 1973).

Copper ores may contain significant recoverable quantities of other metals such as gold, silver, molybdenum, cobalt, zinc, lead, nickel, sulfur, tellurium, selenium, rhenium, palladium, platinum, arsenic, and iron. In addition, many ores mined chiefly for other metals contain recoverable copper (Brobst and Pratt 1973).

In recent years, open pit mining has accounted for about 90% of the production of copper ore (USBOM 1976). Several Arizona copper deposits are being mined by in-place leaching methods, which have much less environmental impact than the more common open-pit techniques. After fracture by explosive or hydraulic methods, copper is leached by sulfuric acid, pumped to the surface, and removed electrolytically. However, only 50-60% of the copper is recoverable by these methods, and all of the byproduct metals (e.g. gold, molybendum, selenium) are left in the rock during leaching (Brobst and Pratt 1973).

Surface restoration of areas mined for copper is very difficult due to the finely powdered mill tailings and a high ratio of waste to produced metal. Water pollution by mine waste is a problem, especially because many large copper deposits are in arid regions making adequate water supplies increasingly difficult to obtain (Brobst and Pratt 1973).

Copper occurs in at least 160 minerals, the most abundant being chalcopyrite ($CuFeS_2$), bornite (Cu_5FeS_4), and chalcocite (Cu_2S) (Brobst and Pratt 1973). Copper produced as a byproduct from nickel deposits makes a significant contribution to the supply. Such deposits can be found in Minnesota and, although not mineable at present, represent a very important future copper resource (USBOM 1976).

Porphyry copper deposits in the southwestern United States (see Map 2) make up a significant portion of the world's identified copper resources. The western United States also contains some of the most important hypothetical copper reserves (Brobst and Pratt 1973). Other copper deposits are scattered throughout the Appalachian Mountains and near Lake Superior (USBOM 1976; Barr Engineering Co. et al. 1980). The identified resources in the United States as of 1975 are 90 million tons of copper ore, with an additional 320 million tons available in other resources (USBOM 1976). The greatest likelihood of new discoveries, based on geological evidence, is in the southwest. A possibility of finding large deposits in the Appalachians still remains (Brobst and Pratt 1973). Principal copper producing states in 1979 were Arizona (65%), Utah (13%), New Mexico (12%), Montana (5%), and Michigan (3%). Domestic production of copper in 1979 was 1.43 million metric tons (USBOM 1980).

Map 2 (Figure 5) and comments pertaining to Maps 4-7, 11. Data on deposits of the six metallic minerals -- copper (Map 2), gold (Map 4), iron (Map 5), molybdenum (Map 6), nickel (Map 7), and silver (Map 11) -- were obtained from the USGS National Atlas Minerals File. This computerized file indicates the relative amount (high, medium, or low) based on past production, current activity, and estimated reserves for deposits within mining districts. These data were used to compile the mineral maps in The National Atlas of the United States of America (USGS 1970, pp. 178-180). The recently updated files were provided by R. A. Weeks, USGS retired, who compiled the National Atlas minerals maps.

Mining districts were cross-referenced to counties. Often several mining districts occur within a county with each district containing deposits of a particular mineral. However, since the data set indicates only relative amounts within mining districts, it was not possible to classify counties according to relative importance. It is unclear whether a county with two medium or three low level deposits was as important for future mining activity as a county with a single high level deposit. Therefore, counties were simply tabulated as having a mineral present or not. The maps do not distinguish between major ore deposits which may be actively mined, and minor occurrences which may never be mined due to economic considerations.

Additional counties in Missouri containing copper deposits of concern to FWS but not shown on Map 2 are listed in Appendix C (R. Welford, FWS, Twin Cities, MN, pers. comm.).

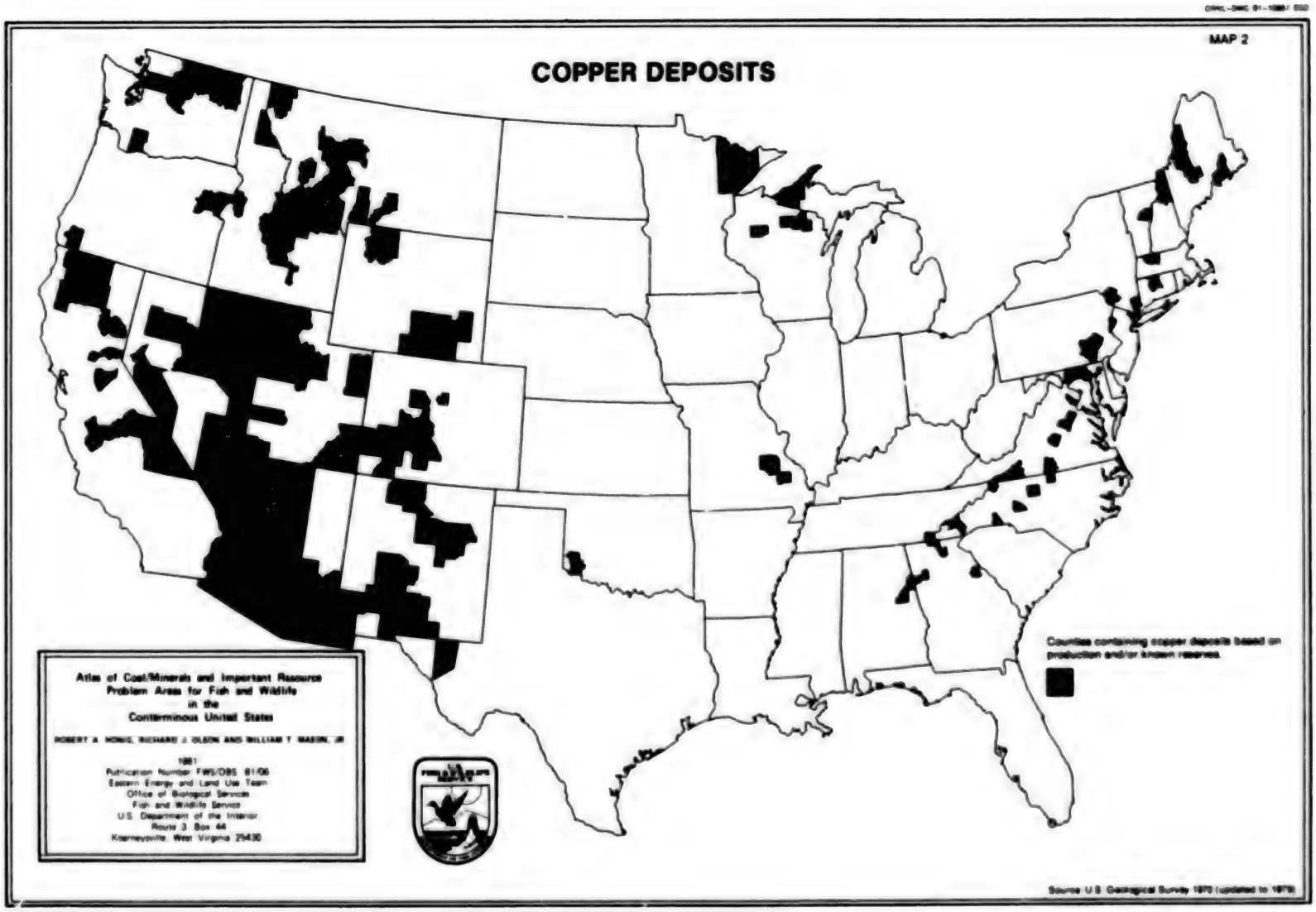

Figure 5. Counties containing copper deposits.

Geothermal Resources

The principal use of geothermal energy is in the generation of electricity. Other uses are space heating, air conditioning, agricultural heating, water desalinization, drying, aquaculture, and the processing of paper, diatomite, and salt. Byproducts of geothermal energy utilization include dry ice, boron, and calcium chloride (Brobst and Pratt 1973; Suter 1978).

The geothermal resource base is defined as all the heat above 15°C in the earth's crust (Brobst and Pratt 1973). Only a small fraction of this heat can be properly considered a resource as most of the geothermal heat is far too diffuse to ever be recovered economically. However, economically useful concentrations of geothermal energy occur locally in restricted volumes. In such "hot spots," high temperatures (65° to 340°C) are found in porous rock containing liquid water and/or steam (Godwin et al. 1971; Brobst and Pratt 1973). The energy in a geothermal reservoir is stored in rocks and to a lesser extent liquid water and/or steam-filled pores or factures. The water and steam provide the means of heat convection from deep sources to shallow depths. Where liquid water is present, it is held at temperatures above the surface boiling point by the confining pressures. Geothermal reservoirs are found in regions of recent vulcanism and mountain building and in the deep parts of many sedimentary basins (Godwin et al. 1971). The geothermal resources of the United States are roughly estimated as being between 10^{18} and 10^{25} calories (Brobst and Pratt 1973).

Three types of geothermal resources are or may soon be used as energy sources: hydrothermal; geopressured; and hot, dry rock. Hydrothermal resources consist of steam or water heated by volcanic material that has intruded into the earth's mantle. Most of the hydrothermal resources in the conterminous United States are located in the tectonically active areas of the west. With the exception of the heavily agricultural Imperial Valley, California, most of these occur in areas of low population density. Geopressured resources consist of trapped hot water that has prevented full compaction of the rock formation and supports much of the overburden weight. Hot, dry rock resources consist of areas with higher than normal heat flow gradients but no suitable aquifer (Suter 1978).

In general, geothermal energy generation has a far lower environmental cost than nuclear or fossil-fuel processes. Normal drill pad construction for geothermal operations requires 2-6 acres. These pads are routinely constructed as multi-well pads (3-6 wells). Geothermal energy generation produces only a fraction of the atmospheric particulate pollutants as do fossil-fuel plants and emits small, non-harmful amounts of Rn^{222}, a radioactive isotope of radon (W. M. Spaulding, Jr., Ecological Services, FWS, Washington, DC, pers. comm.). However, carbon dioxide, usually the predominant noncondensible gas in geothermal fluids, may contribute to climatic warming via the "greenhouse effect." Toxicity due to hydrogen sulfide is only a problem in confined spaces, and conversion to SO_2 (sulfur dioxide) may increase SO_2 concentrations downwind. Mercury is also present in most geothermal fluids (Suter 1978). Waste heat from geothermal resources is a potential thermal pollutant. Some hydrothermal fluids contain high solute concentrations which may pose a chemical pollution hazard to surface and ground waters. Ground subsidence, due to fluid withdrawal or thermal contraction may also occur (Brobst and Pratt 1973; Suter 1978).

Map 3 (Figure 6). Geothermal resource areas were classified as having potential water temperatures greater than 150°C, 90-150°C, or less than 90°C. The hydrothermal convection systems have reservoir temperatures greater than 90°C within 3 km of the surface; all of these areas occur in the west. Geothermal areas in the west having potential for development were defined from a 1:2,500,000-scale map (SAI 1980a). If a county had several levels of potential resources the county was classified according to the hottest resources indicated. The thermal waters (water less than 90°C within 1 km of the surface) are potential sources of low-grade thermal energy; however, areas favorable for development of these resources are not well defined (Muffler 1979). Locations of areas in the east most favorable for discovery and development of local sources of low temperature thermal water were obtained from USGS Circular 790 (Muffler 1979).

Other areas in New Mexico containing geothermal resources of concern to FWS were defined on the basis of information supplied by the FWS Regional Office in Albuquerque, New Mexico (Joseph W. Kathrein, pers. comm.).

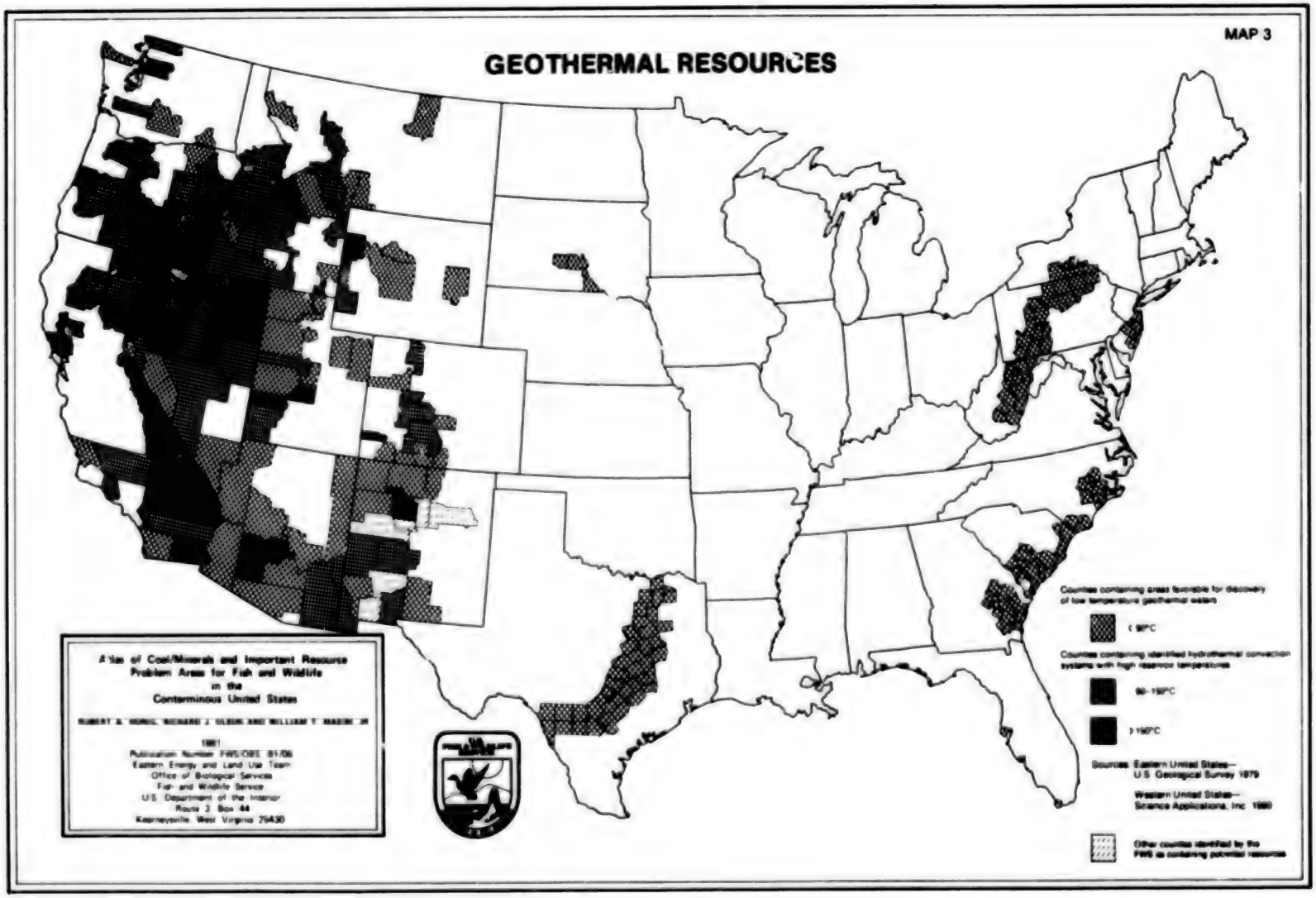

Figure 6. Counties containing geothermal resources.

Gold

Gold has been treasured since ancient times for its beauty and permanance and in the twentieth century has emerged as an essential industrial metal. Most gold used in industry is in the form of metal or metal alloys (17). Gold has been traditionally used in the manufacture of jewelry and in dentistry; more recently it has been used widely in the aerospace, electronics, and computer industries (Brobst and Pratt 1973). Specialized gold compounds are made for a diversity of uses, for example in medicines and glass. Because of the role of gold as the principal medium of monetary exchange, about half of the world's supply of gold has been immobilized by agreement between major industrialized countries (USBOM 1976). This has been a significant factor in the recent soaring gold prices.

The world production of gold is dominated by the Republic of South Africa which annually has produced over half of the world's total output over the last 15 years (Brobst and Pratt 1973; USBOM 1980). Nearly all gold mines in the United States are in the west (USBOM 1980), primarily South Dakota, Nevada, Utah, and Arizona. About 50 to 60% of United States gold production comes from gold ores, with the remainder being a byproduct of copper and other base metal production. Silver, because of its association with gold in nature, is a coproduct of virtually all gold mining. Gold is also recovered from nickel, copper, and platinum mining. Other byproducts and coproducts of gold are mercury, zinc, lead, sand and gravel, platinum, palladium, tungsten, fluorine, uranium, and osmiridium (USBOM 1976).

About one-third of domestic gold production comes from a deep underground mine in South Dakota operated by the Homestake Mining Company. Most of the remainder is produced from open pit mines. Placer mining by dredging of large alluvial or marine deposits may once again become an important source of gold in the future (USBOM 1976).

Current U.S. gold reserves are estimated at 120 million ounces, with an estimated 120 million ounces of other resources (USBOM 1976).

Map 4 (Figure 7). See section on Copper for discussion of the map data base.

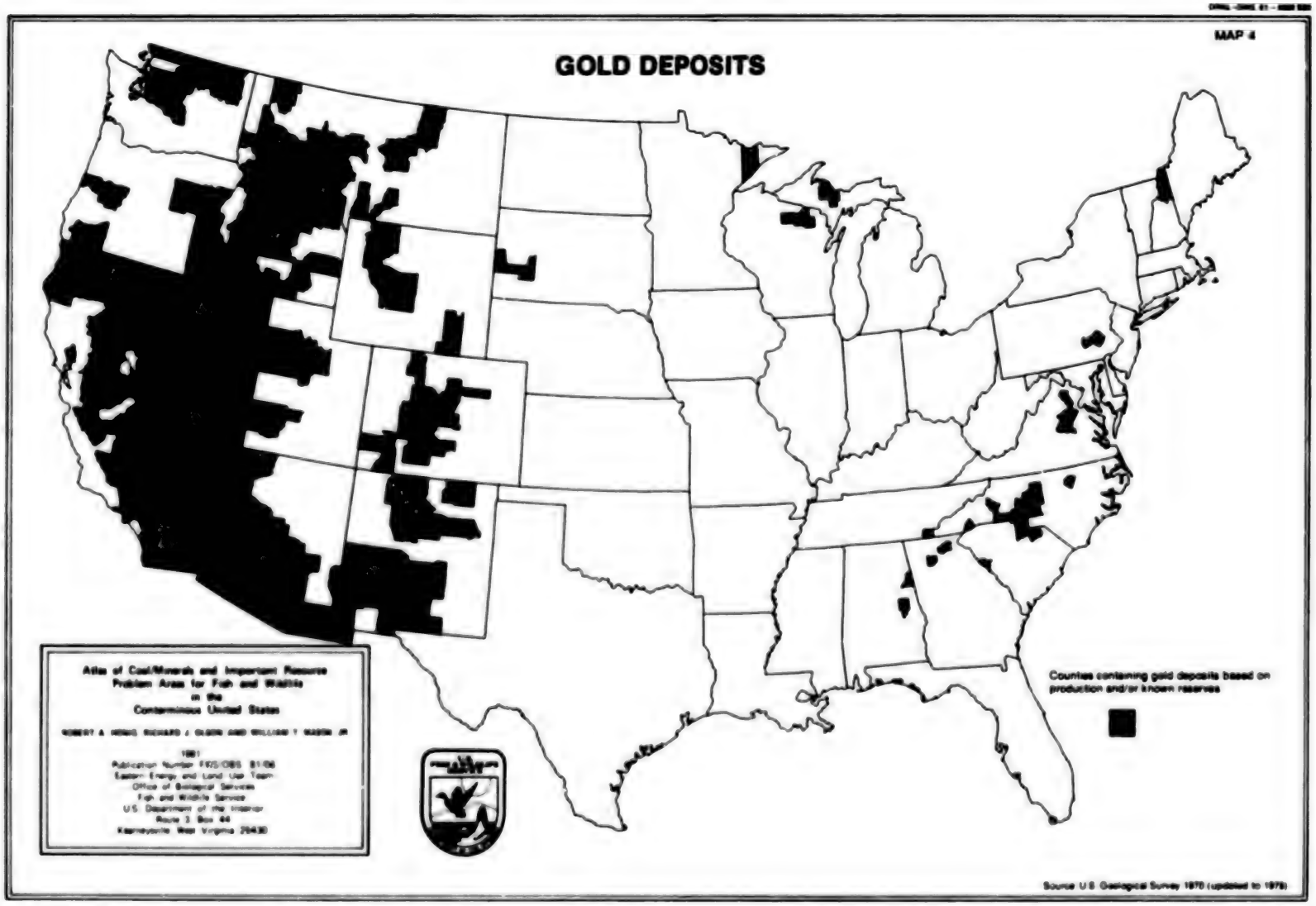

Figure 7. Counties containing gold deposits.

Iron

Iron is an abundant, readily extractable metal and is the metal that is most widely used by man. It has strength, hardness, and durability combined with properties that make possible fabrication into a multitude of forms. Alloying of iron and other elements into steels, in which the desirable properties of iron are enhanced, has greatly increased its usefulness. Iron and steel are used as structural components and mechanical elements and in tools, containers, and fasteners (Brobst and Pratt 1973). Most of the iron ore not manufactured into iron metal and steel is used in the production of heavy-media materials, mainly for coal preparation plants, and for cement. Smaller amounts are used in the manufacture of ferroalloys, paint, high-density concrete aggregate, ferrites, and as a mineral additive to animal feeds. Byproducts of U.S. iron mining operations include manganese, titanium, phosphate (apatite), copper, and small quantities of silver and gold (USBOM 1976).

Most iron ore is mined in open pits since most commercial ore bodies lie close to the surface and have large lateral dimensions. Underground methods are used for mining narrow, steeply dipping, or deep ore bodies. However, high costs and limited production capacity have reduced the ability of underground operations to compete with open pit mines (USBOM 1976).

The United States annually produces more than 80 million tons of iron, of which about 80% is from the Lake Superior region (Brobst and Pratt 1973; USBOM 1980; Barr Engineering Co. et al. 1980). Identified, economically extractable reserves in the United States amount to 4 billion tons, with another 14 billion tons of identified resources that may become profitable under future economic conditions (USBOM 1976). United States iron reserves and potential resources are sufficient to meet domestic needs for many decades. However, due to economic considerations, the United States is a net importer of finished steel and iron ore (Brobst and Pratt 1973).

The environmental problems specifically associated with iron ore mining are primarily related to scale: the mines and recovery plants are huge. Many open pit mines in the Lake Superior region are a mile or more wide, several miles long, and several hundred feet deep. Large masses of waste material, frequently two to three times that of the ore mined, must be disposed of. The waste has been frequently left in unsightly piles adjacent to the mine rather than being returned to the mine pit. The pits themselves can become manmade lakes if proper reclamation methods are employed (Brobst and Pratt 1973).

Map 5 (Figure 8). See section on Copper for discussion of the map data base.

Additional counties in Missouri containing iron deposits of concern to FWS but not shown on Map 5 are listed in Appendix C (R. Welford, FWS, Twin Cities, MN, pers. comm.).

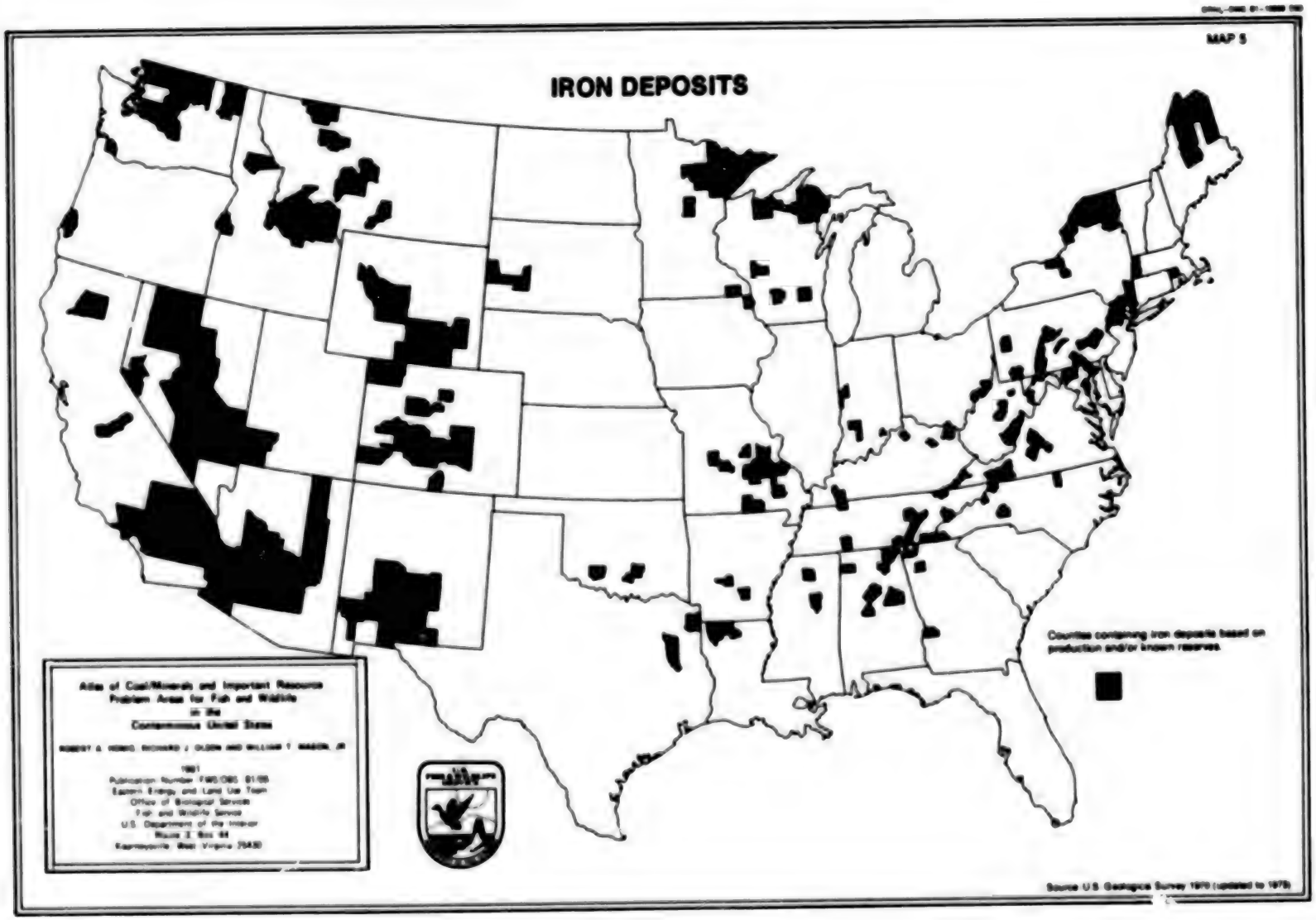

Figure 8. Counties containing iron deposits.

Kaolin

Kaolin, or China clay, is a clay-like material approximating the mineral kaolinite; the term encompasses the other kaolin-group minerals, such as halloysite and dickite. Kaolin is a unique industrial material because it is chemically inert over a relatively wide pH range, is white, has good hiding power when used as a pigment or extender in coated films and filling applications, is soft and nonabrasive, has low heat and electrical conductivity, and costs less than most competing materials (USBOM 1976). Kaolin is easily dispersible and can be fired at high temperatures without warping or changing color (Brobst and Pratt 1973). The major domestic uses for domestic kaolin in 1979 were as a filler or coating for paper (43%), as refractories (15%), and in the manufacture of rubber (9%) (USBOM 1980). Minor uses include pottery, dinnerware, stoneware, white cement, catalysts in petroleum cracking (Brobst and Pratt 1973), fiberglass, paints, and plastics (FWS 1977a). In some locations, silica glass sand, muscovite, and bauxite are byproducts or coproducts of kaolin mining (Brobst and Pratt 1973; USBOM 1976).

Domestic production of kaolin in 1979 was about 8 million tons (USBOM 1980). Georgia and South Carolina are the major producers, with smaller quantities produced in Alabama, California, Florida, Idaho, North Carolina, Pennsylvania, Texas, and Utah. Reserves of kaolin in the coastal plain of Georgia, Alabama, and Mississippi are estimated to contain more than 300 million tons while other deposits are scattered throughout the Appalachian region. The nation's total kaolin resources, which contain a much higher percentage of impurities than the reserves, are estimated to be at least 5 billion tons. These resources include deposits in North Carolina, California, Washington, Idaho, Utah, and Nevada (Brobst and Pratt 1973).

Most kaolin is surface-mined, thus introducing the potential for aesthetic impacts, dust, and sedimentation in surface waters. Some kaolin deposits are exploited by hydraulic mining and dredging. Recovery is near 100% of the mineable beds in open pit mines, and the waste-to-kaolin ratio is generally about 7:1 (USBOM 1976).

Limestone and Dolomite

Limestone is composed of the mineral calcite ($CaCo_3$) and dolomite is composed of the mineral dolomite ($CaMg(CO_3)_2$). However both are called limestone by the industry, and intermediate varieties are not distinguished. Some newly deposited limestone is composed of the mineral aragonite, which has the same chemical formula as calcite and gradually changes to calcite over time. Calcite and dolomite commonly occur in the same rock, but generally one predominates in any one stratigraphic layer (Brobst and Pratt 1973).

Limestone is used chiefly in the production of construction stone, which consumed nearly two-thirds of U.S. limestone production in 1969, and portland cement, which consumed about 15% of domestic production. Fluxes, for blast and open-hearth furnaces, and the manufacture of lime consumed another 5% each, while agricultural limestone accounted for about 4% of consumption (Brobst and Pratt 1973). Limestone is also used in the manufacture of glass and for sulfur dioxide removal from stack gases at power plants (NAS 1980a). More than 628 million tons of limestone and dolomite were used in the United States in 1969 (Brobst and Pratt 1973).

Limestone and dolomite formations are widespread in the United States, and nearly every state has deposits that are adequate for construction and other uses not requiring chemically pure stone. High-purity carbonate rock formations are far less widely distributed than impure carbonate rocks. However, some high-purity formations are widespread, occurring in mineable thicknesses nearly continuously over areas of many hundreds, and sometimes thousands, of square miles. Limestone resources are large and are expected to supply domestic needs for hundreds, or even thousands, of years (Brobst and Pratt 1973).

Exploitable limestone and dolomite formations occur most extensively in the slightly deformed rocks of the mid-continent, especially in Kentucky, Tennessee, Missouri, and states adjacent to the Great Lakes. Furthermore, in the Appalachian Plateaus and the plateau regions of the western United States there are relatively flat layers of limestone and dolomite at mineable depths over wide areas. High purity limestone is found in central Pennsylvania, western and southwestern Virginia, and the eastern panhandle of West Virginia. The eastern panhandle of West Virginia also contains deposits of high-purity dolomite, as does western Ohio, which is the chief source of high-purity dolomite (Brobst and Pratt 1973). Limerock is also being mined extensively in south Florida in the conservation area between Miami and the Everglades (Ronald J. Haynes, Regional Office, FWS, Atlanta, GA, pers. comm.).

The environmental impacts of limestone exploitation are essentially the same as those associated with sand and gravel mining. In addition, there is evidence that mining operations involving carbonate rocks may cause elevations in alkalinity of surface waters (NAS 1980a).

Molybdenum

Molybdenum is important as an alloying metal, imparting increased hardness, toughness, and corrosion resistance to iron, steel, and stainless steel. It is an essential alloying metal in the manufacture of superstrength steel for heavy construction, such as in skyscrapers and bridges. A small percentage of molybdenum is used as molybdenum metal and in pigment, catalysts, agriculture, chemicals, and lubricants (Brobst and Pratt 1973). Molybdenum is mined by open pit and a variety of underground methods (USBOM 1976).

Molybdenum is virtually the sole metal of which the United States is a net exporter (Brobst and Pratt 1973). Domestic production in 1979 was just over 140 million pounds (USBOM 1980) amounting to about 60% of the world's production (Brobst and Pratt 1973). Domestic consumption in 1970 was approximately 74 million pounds (USBOM 1980).

About half of the world's molybdenum resources are in the United States. Most of the identified resources in the United States occur in Colorado and New Mexico (Brobst and Pratt 1973). The total identified resources in the United States amount to approximately 35 billion pounds (Brobst and Pratt 1973; USBOM 1976). Large quantities of molybdenum are probably still hidden in areas of known deposits. An estimate of such hypothetical resources amounts to about 1 billion tons worldwide, with about 500 million tons located in the United States (Brobst and Pratt 1973).

Molybdenum does not occur in nature in a pure metallic state. It is found only in combination with other elements such as sulfur, oxygen, tungsten, lead, uranium, bismuth, iron, magnesium, cobalt, vanadium, and calcium. Minerals of current economic importance are molybdenite (molybdenum disulfide, MoS_2) and to a lesser extent ferimolybdite ($FeMoO_3H_2O$) and jordisite (amorphous molybdenum disulfide) (Brobst and Pratt 1973). Molybdenum is recovered as a byproduct of copper, tungsten, and uranium ores; and iron, rare earths, sulfur, tin, and tungsten are byproducts of molybdenum ores (USBOM 1976). Presently about 25% of United States molybdenum is produced as a byproduct of copper mining (Brobst and Pratt 1973).

Map 6 (Figure 9). See section on Copper for discussion of the map data base.

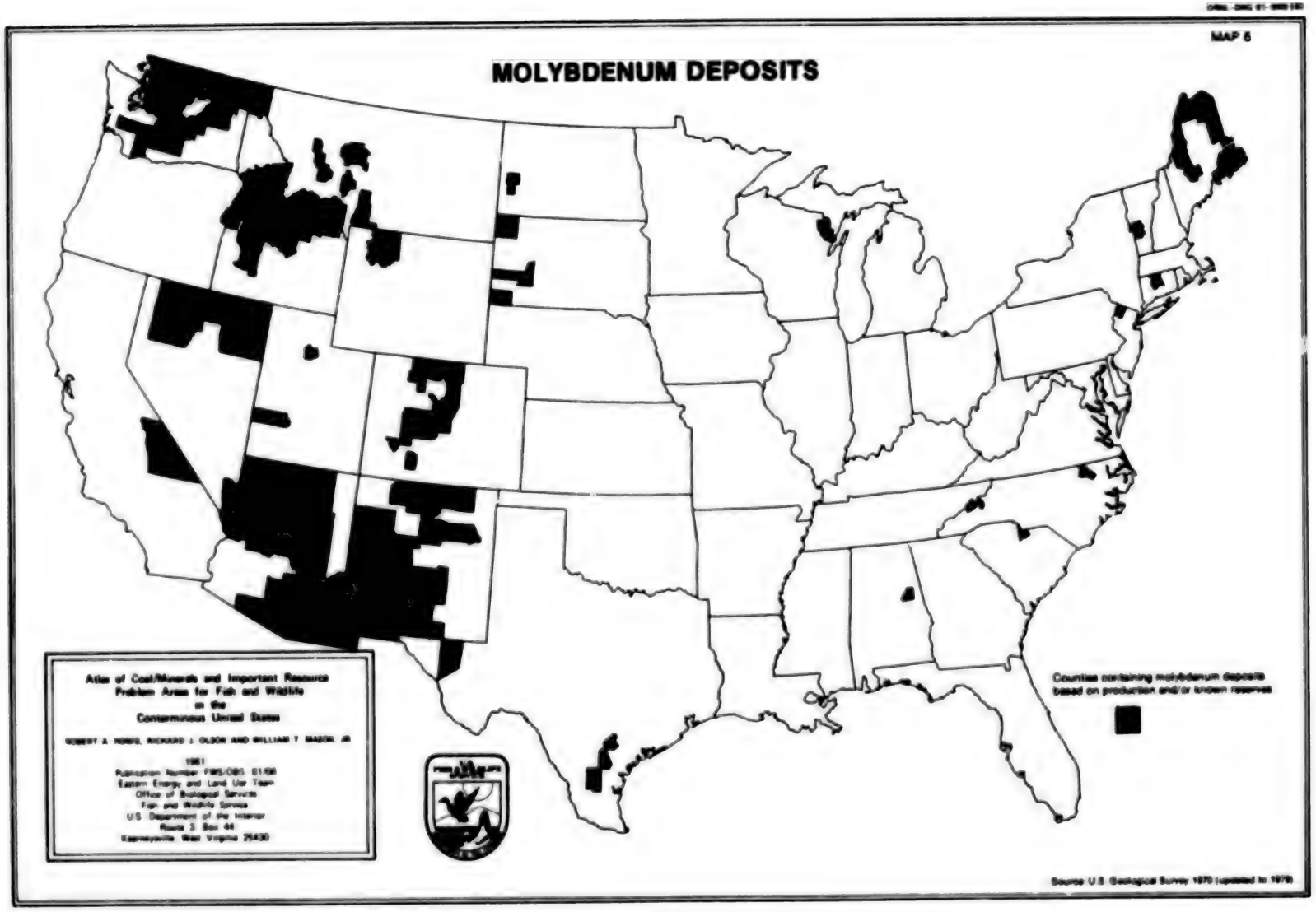

Figure 9. Counties containing molybdenum deposits.

Nickel

More than 90% of nickel is used in the form of metal (USBOM 1976). The greatest value of nickel is in alloys with other elements where it adds strength and corrosion resistance over a wide range of temperatures. As such it is an essential component of the iron and steel industry (Brobst and Pratt 1973), the manufacture of superalloys for use in aircraft, and the production of various salt water resistant alloys for use in ship building. Nickel is also used in batteries, dyes and pigments, insecticides, and catalysts. Byproducts and coproducts of nickel production include copper, platinum, cobalt, silver, gold, palladium, iridium, osmium, rhodium, ruthenium, selenium, tellurium, iron, ammonium sulfate, and urea (USBOM 1976).

Nickel is mined by open pit and underground methods. The only domestic primary nickel producing mine in 1979 was an open pit mine in Riddle, Oregon (Douglas Co.), although some nickel is produced as a copper byproduct and from secondary sources such as scrap metal (USBOM 1976, 1980).

U.S. reserves of nickel are small; over 70% of consumption is imported (USBOM 1980). Identified, economically recoverable reserves in the United States total about 200,000 tons, essentially entirely at the Riddle, Oregon, deposit. Other identified resources which may become economically recoverable in the future total about 15 million tons. Ocean nodules may also represent a potential resource if processing and mining technologies are developed (USBOM 1976).

Map 7 (Figure 10). See section on Copper for discussion of the map data base.

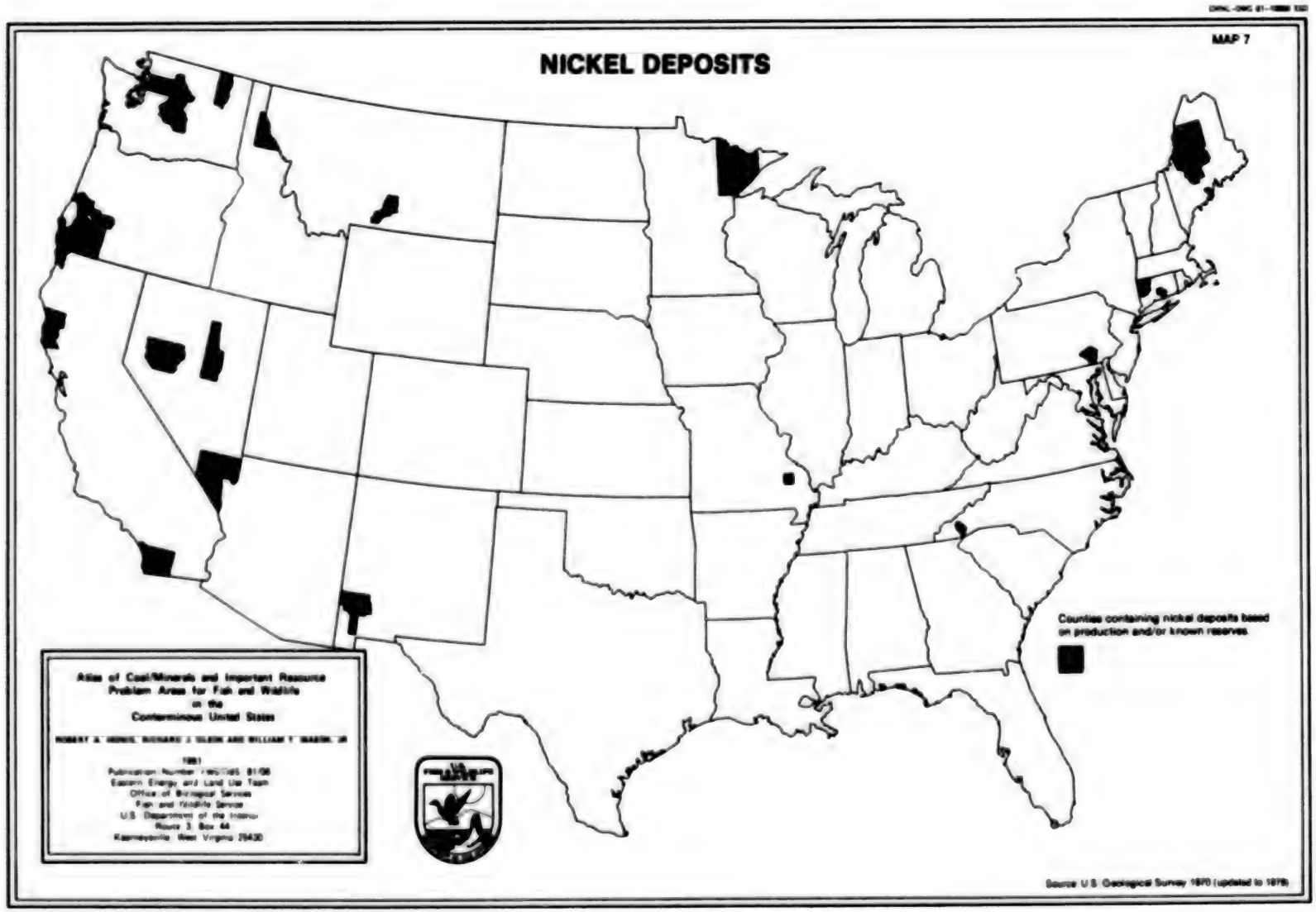

Figure 10. Counties containing nickel deposits.

Oil Shale/Tar Sands

Among the materials from which synfuels (synthetic organic products) can be made are oil shale and tar sands. Oil shale is a fine-grained sedimentary rock containing kerogen, an organic substance similar to the materials which have produced naturally occurring oil and gas. High-grade shale can yield 35 gallons or more per ton of shale and may also yield recoverable sodium bicarbonate, sodium carbonate, and aluminum (Brobst and Pratt 1973; Rickert et al. 1979). Tar sands are porous sandstones containing viscous to solid petroleum unrecoverable by conventional methods (Rickert et al. 1979). Although previously not economically viable, oil shale and tar sand ventures may soon become practical due to the rising demand for new energy sources (Brobst and Pratt 1973).

Oil shale and tar sand deposits are found in all but a few states, however the resources of economic interest are concentrated in the Green River Formation of Colorado, Utah, and Wyoming (Brobst and Pratt 1973; Rickert et al. 1979; NAS 1980b). The eastern Devonian black shale, especially outcroppings, is thought to have good potential as an energy resource. The eastern deposits have the advantage of greater water availability for the mining process. Identified resources of shale oil in the United States are estimated at 2 trillion barrels in shale yielding greater than 15 gallons of oil per ton of shale (Brobst and Pratt 1973; Rickert et al. 1979). Between 400 and 600 billion barrels of the reserve are believed to be recoverable (Dick and Wimpfen 1980). The estimated amount of recoverable oil in the Green River Formation is nearly equal to the estimated total of proved and undiscovered resources of conventional petroleum in the United States (NAS 1975). The estimated reserve of tar sand oil in the United States is 29 billion barrels (NAS 1975; Rickert et al. 1979).

At present, there is no commercial production of tar sand oil in the United States (Rickert et al. 1979), however similar deposits in Canada are being mined by the open-pit method (Dick and Wimpfen 1980). Oil shale also can be mined by conventional surface mining procedures. However to eliminate the disposal problem associated with surface processing -- which produces large volumes of solid waste -- several underground (in situ) methods have been proposed. One method involves fracturing the rock, introducing heat to liquefy the kerogen, and removal of the oil via wells (Rickert et al. 1979). Modifications of this method have also been proposed. Futhermore, formation of potentially hazardous chemicals in the underground retort poses a serious threat of ground water pollution (NAS 1979).

Because mining of oil shale and tar sands is linked with on-site processing for recovery of oil, environmental problems associated with development of these minerals are somewhat unique. Unusual liquid, gaseous, and solid wastes may be produced, and the waste disposal and processing will require significant amounts of water (Rickert et al. 1979), further taxing the already overburdened western water supply. Water consumed by an oil shale processing facility probably would range from 1.5 to 4 barrels of water (possibly less for true in situ processing) per barrel of oil, depending on the location and the technology used. If water used for reclamation, power generation, and disposal of processed shale is included, up to 5 barrels of water per barrel of oil may be consumed. Consumption of 3 barrels of water per barrel of oil is realistic average estimate for surface processing (NAS 1980b).

Leachates, whether from in situ or surface operations, may cause a reduction in water quality. Futhermore waste water produced during retorting typically contains high concentrations of organic chemicals. The large land area required for solid waste disposal will alter existing land uses and wildlife habitats. Deer populations, which migrate seasonally over wide areas, will be particularly affected. Air pollutants for which no standards yet exist, such as arsenic, mercury, and selenium, may also be produced, along with carbon monoxide, hydrocarbons, nitrogen dioxide, sulfur dioxide, photochemical oxidants, and particulates. Large quantities of carbon dioxide would also be produced, potentially contributing to climatic warming due to the "greenhouse effect" (NAS 1979). Other potential environmental problems associated with oil shale/tar sands development are landslides, erosion and sedimentation, subsidence, disruption of aquifers, and acid mine drainage (Rickert et al. 1979).

Map 8 (Figure 11). The locations of the western deposits were determined by a 1:2,500,000 scale map of the area (SAI 1980b). Two reports (Janka and Dennison 1979; Booz-Allen & Hamilton Inc. 1980) were used to define the location of counties in the east containing outcroppings of the Devonian black shale. The reports contained small scale state maps defining the areas. When both reports had maps for the same state, the maps were nearly identical. The maps also showed areas of Devonian shale underlying younger rocks, though these areas were not included because of the lower probability of their being mined in the near future.

Locations of tar sands were determined from a study (Baughman 1978) that identified the counties containing deposits or included state maps showing the tar sand deposits.

Additional counties in Indiana containing oil shale deposits of concern to FWS but not shown on Map 8 are listed in Appendix C (R. Welford, FWS, Twin Cities, MN, pers. comm.).

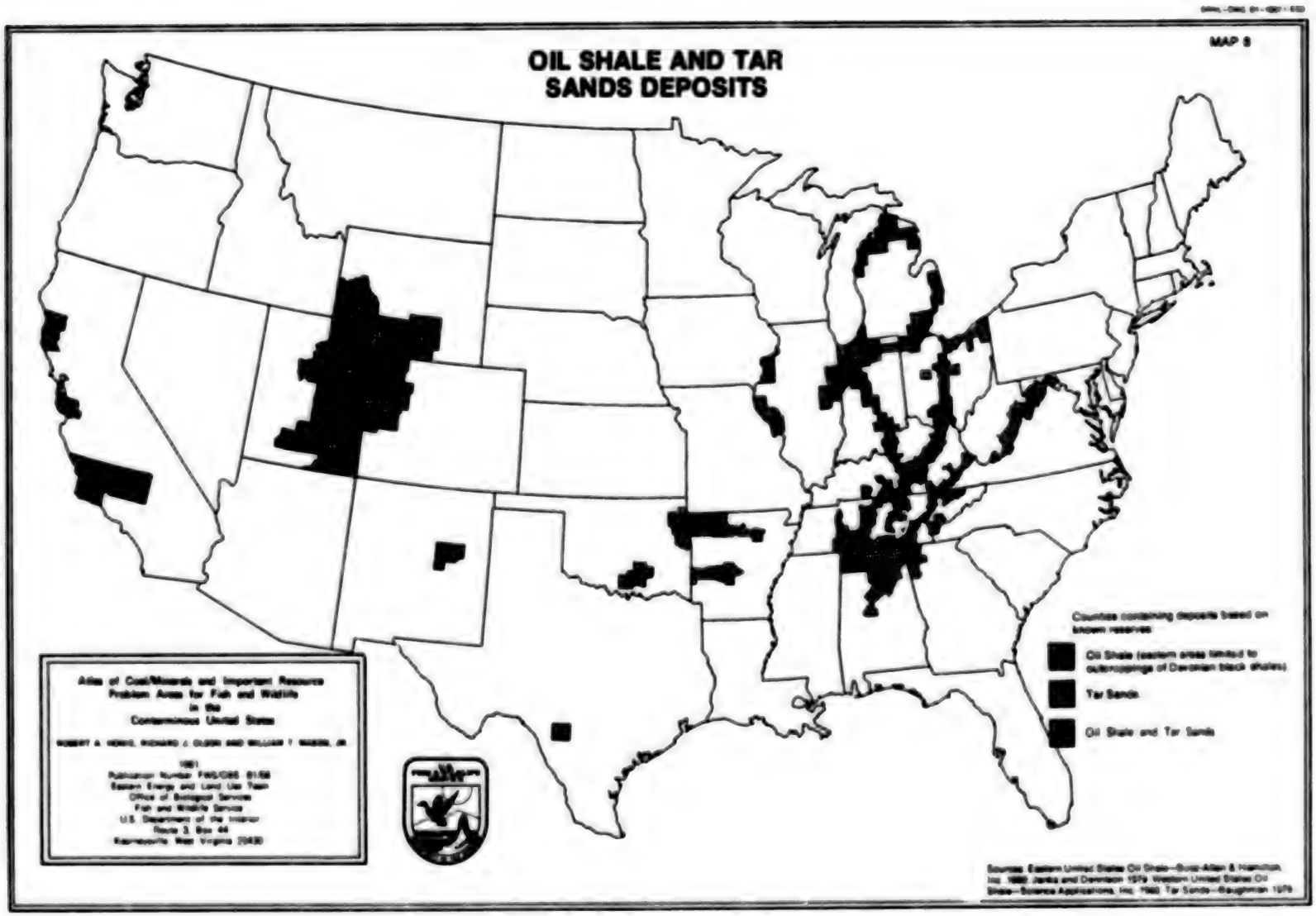

Figure 11. Counties containing oil shale and/or tar sands deposits.

Peat

Peat is a partially decomposed plant matter that has accumulated underwater or in a water-saturated environment. It is usually composed of 10% solid matter and 90% water. Although not classified as a coal, peat is the initial stage in the formation of coal from buried plant matter and was formerly used in the United States, and is still used in Europe, as a fuel. Since it cannot compete with the other more efficient fuels on the U.S. market, virtually all peat consumed domestically is used for agricultural and horticultural purposes. Ninety percent of domestic peat sold in 1974 was for domestic soil improvement to be used specifically in landscaping, as a base for lawns and golf courses, for mulching and improving soils, and by nurseries and greenhouses. Other potential uses of peat are as a filtering agent to remove pollutants from water, as an absorbant in oil spill cleanup, as a light and insulative building material, and as a raw material for wood alcohol distillation (USBOM 1976).

Virtually all peat in the United States is extracted by machinery; however, methods and equipment differ greatly depending on the characteristics of the deposits. In general, the peat is either cut out of or scraped from the surface. Most operations employ conventional excavating and earthmoving equipment, sometimes modified specifically for extracting peat. Where it is impractical to drain a peat deposit which is covered by water, specially adapted equipment, such as dredges and clamshells, is used (USBOM 1976).

The peat resources of the conterminous United States are on roughly 19 million acres (FWS 1977b) in 42 states and amount to 13.8 billion tons. Approximately 90% of this total is located in Minnesota, Wisconsin, Michigan, and Florida. More than half of the resources in the conterminous United States are located in Minnesota with recoverable reserves estimated at almost 7 billion tons covering more than 5 million acres. More than three-fourths of the Minnesota peat resource are located in Beltrami, Koochiching, Itasca, and St. Louis counties in the northern portion of the state (USBOM 1976). Only 2.7%, or approximately 200,000 acres, of the peatland acreage in Minnesota is currently being used (FWS 1977b). It should also be noted that the cool moist climate and irregular terrain of Alaska favor the formation of all types of peat deposits (Brobst and Pratt 1973).

Estimated United States peat production in 1979 was 880 tons. Domestic peat production is concentrated in Michigan, Florida, and Illinois, in order of volume. These three states account for about 60% of the total U.S. output, with roughly 30% of total production in Michigan (USBOM 1980). Indiana, Pennsylvania, and New Jersey also produce significant amounts. About one-third of the peat consumed in the United States is imported, with Canada supplying approximately 95% of that amount (FWS 1977a).

Peatlands are part of a group of wetlands as classified by the U.S. Fish and Wildlife Service (Cowardin et al. 1979). As such they are very important wildlife habitats. For example, the Minnesota peatlands support populations of waterfowl, muskrat, beaver, and river otter, and they are very important habitat for spruce grouse, ruffed grouse, sharp-tailed grouse, bear, moose, timber wolf, bobcat, and lynx (FWS 1977b). Thus, extensive development of peatlands has a potential for significant impacts on wildlife due to habitat alteration.

Map 9 (Figure 12). Locations of Class I and II peat resources were determined from a series of small scale state maps contained in two reports (King et al. 1980; Radian Corp. 1980). The nine states included in these reports contain the majority of peat resources in the conterminous United States. The reports define three classes of peat deposits. Class I areas have the highest potential for "fuel grade" peat which occurs in significant quantities to supply the needs of a large facility such as a 250-million cubic feet-per-day synfuels plant. The deposits usually cover areas greater than 200 square miles. Class II areas have known peatlands but the areal extent and depth are not as promising as Class I areas. The deposits generally cover 20 to 200 square miles and contain enough peat to support a 60-megawatt steam electric plant. Class III areas may possibly contain sufficient quantities of fuel grade peat to supply the small technologies. These deposits generally occur in isolated patches of less than 20 square miles in size. Class III areas were not included in this study due to their lower probability of significant mining in the near future. A county was classified as Class I or II if approximately 5% or more of the county was covered by one of the regions. Class I areas were given priority over Class II if both occurred within a county. Often the reports contained comments that identified additional counties as containing important peat deposits; these counties were also included in the data set.

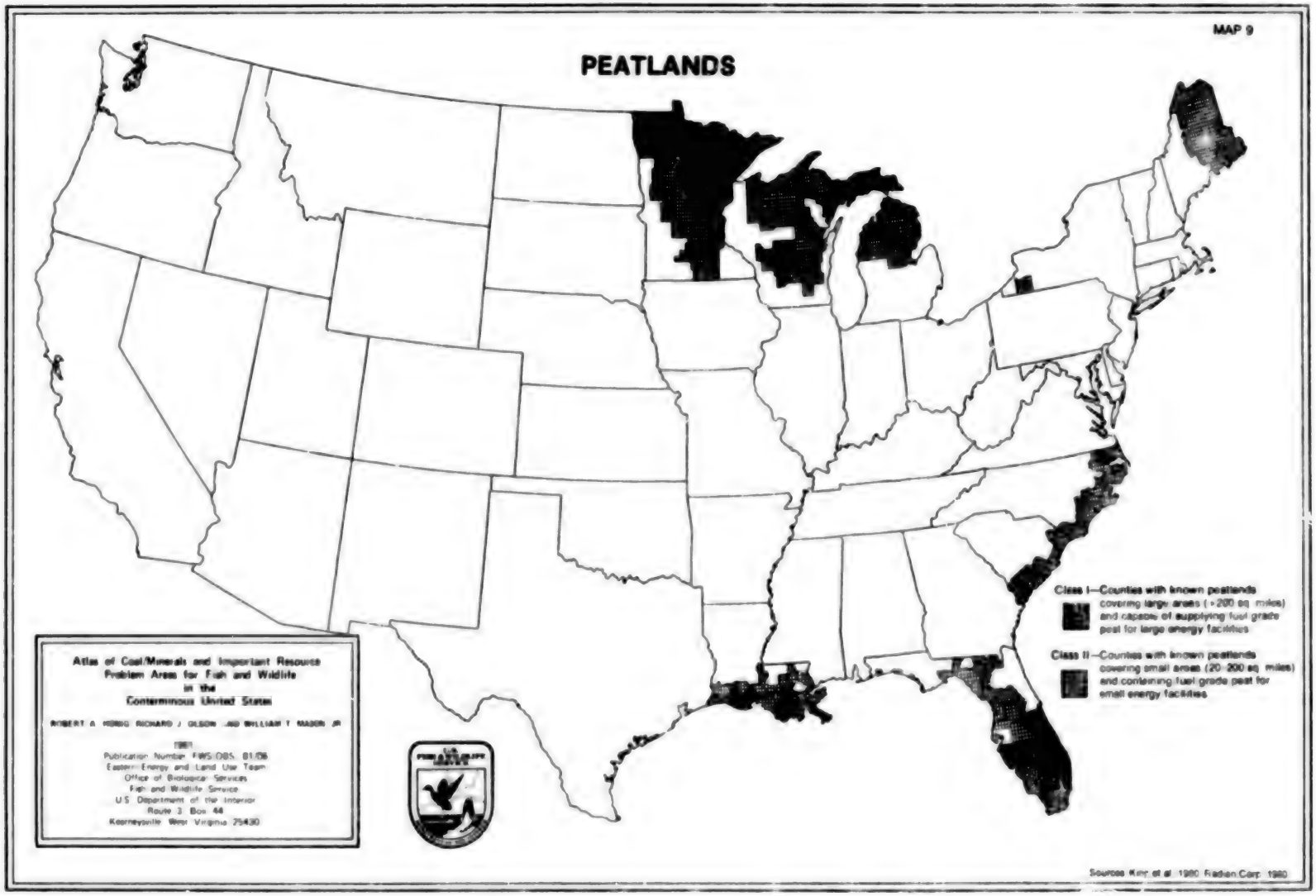

Figure 12. Counties containing Class I and/or Class II peat resources.

Phosphate

Phosphorus, along with nitrogen and potassium, is an essential element for plant growth, but it tends to be less abundant than nitrogen and potassium, especially in heavily cropped or thoroughly leached soils. Thus it is not surprising that about 70% of domestic consumption of phosphate rock is in fertilizer production. The fertilizer industry will continue to be the major consumer since there is no substitute for phosphorus as a plant food. Phosphate is also used in animal feed supplements, detergents, electroplating and metal polishing, insecticides, medicines, and incendiary bombs (Brobst and Pratt 1973).

Most U.S. phosphate rock contains recoverable amounts of fluorine for use in water treatment and conversion into metal fluxes. Florida and western phosphate rock contain from 0.1 and 0.4 pounds of uranium per ton, and western deposits may also contain recoverable vanadium (USBOM 1976).

The total U.S. phosphate rock production in 1979 was approximately 50 million metric tons (approximately 55 million tons), 79% of which comes from Florida. North Carolina produces about 9% of U.S. phosphate rock, Tennessee 4%, and fields in Idaho, Alabama, Montana, and Utah contribute 8% of the total. The United States is a net exporter of phosphate rock (USBOM 1980).

Known recoverable U.S. phosphate rock reserves as of 1973 were estimated at 2.5 billion tons, with another 4.5 billion tons of identified resources that may become economically recoverable in the future. At current levels of production, the commercial deposits in Tennessee are expected to be depleted by 1990. Reserves in Idaho, Montana, Utah, and Wyoming are expected to continue production into the twenty-first century. The large reserves in Florida are capable of supporting maximum production levels until 1995 after which they will be depleted; those in North Carolina are expected to continue maximum production after that date (USBOM 1976).

Phosphate rock is strip mined except for two underground operations in Montana. In Florida and North Carolina the land must often be drained before mining, and the phosphate-bearing matrix is slurried in sluice pits and then pumped to a washing plant. Florida hard rock is not currently mined for phosphate (USBOM 1976).

Use of water in phosphate mine dewatering and processing has lowered the regional water table in Florida by as much as 40 feet, with some disruption of watercourses, destruction of wetlands, and deterioration of water quality. There is also a threat of contamination by radioactive elements associated with phosphate deposits. The waste clays, or slimes, from phosphate mining also pose a problem. Approximately two-thirds of the area mined for phosphate in central Florida since the 1940s has been covered by ponds containing slimes. Slimes cannot be economically reduced in volume and take decades to solidify. The best method for dewatering involves impounding the slimes above ground, but there is always a risk of dike failure. The slimes themselves, once stabilized, can be used only for farming, grazing, or light construction, as they are structurally weak at depth (NAS 1979).

Map 10 (Figure 13). Phosphate deposits were identified from the Bureau of Mines series of State Mineral Profiles (USBOM 1979). Deposits identified in these publications generally reflect past and current activity or deposits that have a high potential for future mining. The data recorded indicates the presence of a deposit and does not distinguish the current or future importance.

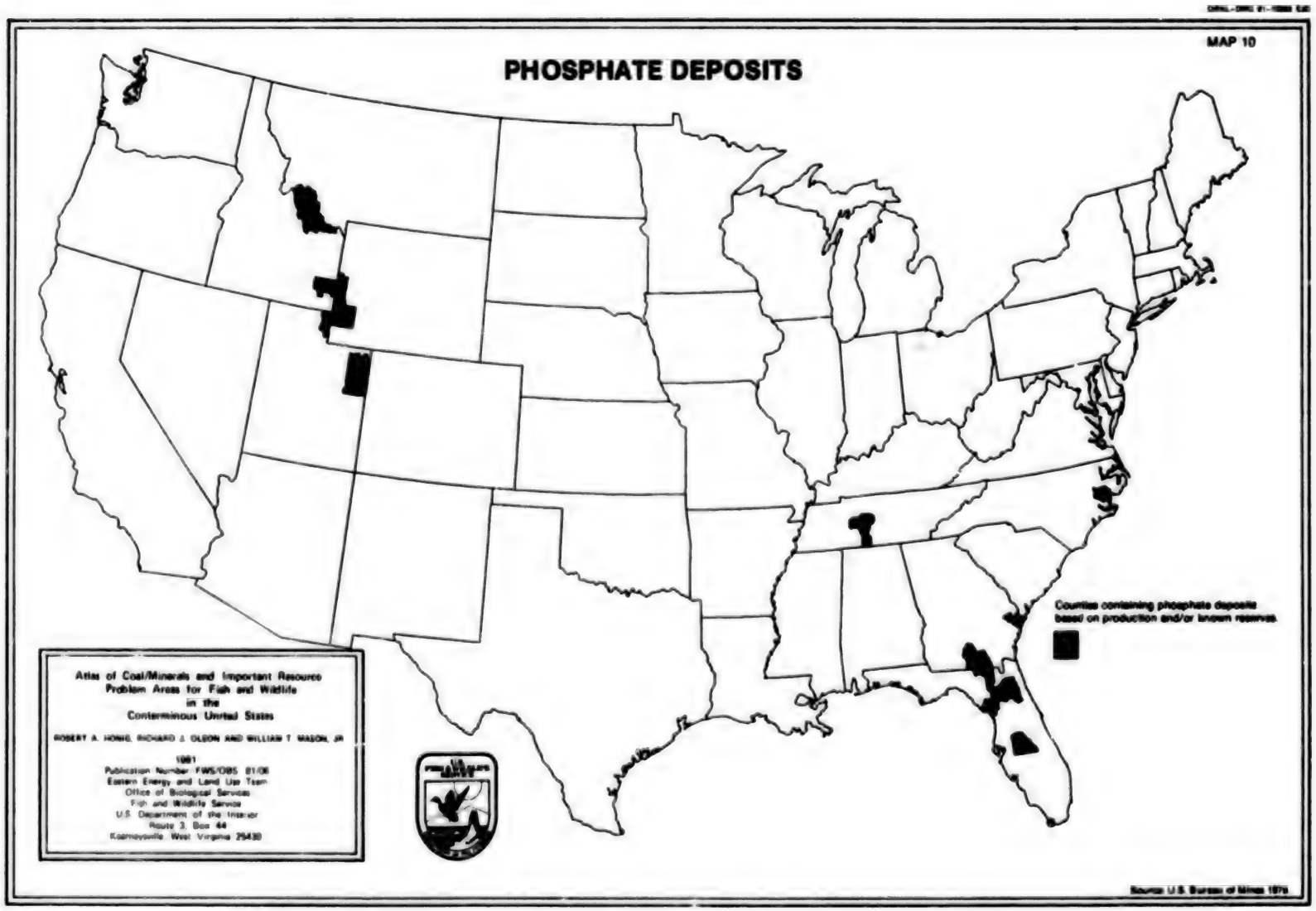

Figure 13. Counties containing phosphate deposits.

Sand and Gravel

Sand and gravel are geologically defined as unconsolidated mineral and rock particles that in most cases have been transported by water and abraded so that their edges are rounded or dulled (NAS 1980a). Sand is defined as material composed primarily of silica and within the size range of 0.0625 to 2 millimeters; sand is also used to describe fine particles of rocks, minerals, slag, and other materials. Gravel consists of naturally occurring rock particles in the size range of 4 to 64 millimeters in diameter. Granules, or "pea gravel," make up the size range from 2 to 4 millimeters (USBOM 1976).

Sand and gravel are important in virtually all construction, and the construction industry accounts for about 95% of all domestic consumption of sand and gravel (Brobst and Pratt 1973; FWS 1977a; NAS 1980a). Most is used in portland cement or asphaltic concrete, as general fill, and as a base under highways (NAS 1980a). Minor uses include railroad ballast and snow and ice control (USBOM 1980). The two components of the product also may be used separately. Of the two, sand has a wider range of uses, for example: in architectural structures; mortar; plaster; and all forms of road and pavement construction. Industrial grade sands are essential in glass manufacturing, foundry operations, chemical and metallurgical processers, and as abrasives. Byproducts and coproducts of sand and gravel production are almost nonexistent. Only small amounts of gold and silver are recovered (USBOM 1976).

Domestic sand and gravel production in 1974 was approximately one billion tons (USBOM 1976) and is the largest nonfuel mineral industry, in terms of volume, in the United States (Brobst and Pratt 1973). Because of the local availability of both sand and gravel, and the high costs of transportation, there results a fragmented industry with small installations located in and near populated areas (FWS 1977a). The five leading construction sand and gravel producing states in 1979 were California, Alaska, Texas, Ohio, and Michigan (USBOM 1980). The San Francisco Bay and Los Angeles areas accounted for 27 of the 100 largest operations in the United States as of 1970, and most of the remainder are east of the Mississippi River in the northern States (Brobst and Pratt 1973). The United States is a net exporter of sand and gravel (USBOM 1980).

The total sand and gravel resources of the United States are literally inexhaustible, however their geographic distribution and quality often preclude economic usefulness (USBOM 1976). By 2000, the economically recoverable resources may barely meet the demand. The most important sources of sand and gravel are river channels, flood plains, and glaciated terrain; however, as these become depleted, marine and lake environments could become important. A major problem currently facing the industry is land-use conflict: land with potentially valuable sand and gravel deposits is presently more valuable for building development and is thus removed from future mineral production. Development of low-cost transportation may be essential for the utilization of remote deposits (Brobst and Pratt 1973).

Sand and gravel are usually loose materials and thus are excavated without blasting (NAS 1980a). The two basic methods are dredging, for deposits that are below the water table, and open pit excavation (USBOM 1976). Thus, the environmental impacts include those typical of open pit methods such as noise, dust, and aesthetic effects. Excessive dust in some quarries can be a problem, especially if minerals such as asbestos are present. Dredging, which is widely practiced in major rivers such as the Mississippi, Missouri, and Ohio, causes increased sedimentation and can greatly alter aquatic habitats (NAS 1980a). Because of the virtual absence of sulfides and salts in sand and gravel deposits, water discharged from the mine sites contains no significant concentrations of dissolved heavy metals or other toxic constituents (NAS 1979). Beneficial effects of sand and gravel excavations include: creation of water bodies for storage or recreation; flood control; creation of migratory and cliff nesting bird habitat; and industrial or housing sites (NAS 1980a).

Zinc

Zinc is a ubiquitous minor element in the earth's crust and is a neccessity to modern living (Brobst and Pratt 1973). It was first called false silver about 2,000 years ago, undoubtedly due to its bluish-white color (USBOM 1976). Major uses of zinc in 1979 were in galvanizing of iron and steel products (40%), zinc-base alloy die castings (29%), brass and bronze (14%), zinc oxide (12%), and other uses (5%) including rolled zinc metal. Major industrial consumers of zinc in 1979 were the manufacture of construction materials (40%), transportation equipment (26%), electrical equipment (12%), and machinery and chemicals (10%). About one-half of the consumption was in Illinois, New York, Ohio, and Pennsylvania (USBOM 1980). Byproducts and coproducts of zinc include gold, silver, copper, lead, fluorspar, and manganese. In fact, many important zinc mines in the United States were initially lead or lead/silver mines. The host rocks in Tennessee, Virginia, and the Upper Mississippi Valley are limestone and dolomite, and large quantities of the tailings are sold as agricultural limestone or crushed stone (USBOM 1976).

The principal methods for mining zinc are room and pillar (excavating chambers in a gently sloping ore body and leaving pillars of rock to support the roof), shrinkage (successively mining flat or inclined cuts or slices progressing upward from a haulage level), cut and fill, and square pit. Except for a few mines in Canada, open pit and block caving methods have not been extensively used (USBOM 1976).

Zinc production in the United States in 1979 was approximately 260,000 metric tons (approximately 287,000 tons). Major producing states were Tennessee (31%), Missouri (23%), New Jersey (12%), and Idaho (12%) (USBOM 1980). Identified, economically extractable reserves of zinc in the United States amount to 30 million tons, with another 20 million tons which may become economically recoverable under future economic conditions. The largest demonstrated reserve is in the southeast Missouri lead district where zinc is a coproduct of lead; the next largest is in eastern and middle Tennessee. Other states with notable reserves are Maine, New Jersey, New York, Pennsylvania, Virginia, Illinois, Wisconsin, Idaho, Montana, Washington, Arizona, California, Colorado, New Mexico, and Utah (USBOM 1976; Barr Engineering Co. et al. 1980).

Silver

Silver, a critical element in our national economy, is a major industrial metal, the physical properties of which make it desirable for a variety of uses. It is extremely ductile and malleable, it has the highest electrical and thermal conductivity of all metals, its compounds are highly photosensitive, and it is stable in air and water except for tarnishing when exposed to sulfur compounds. Adequate, low-cost substitutes are very difficult to find (Brobst and Pratt 1973).

The largest single use of silver in 1979 was in the photographic industry which accounted for 39% of consumption (USBOM 1980). Photography is based almost entirely on light-sensitive silver halides derived from silver nitrates and related compounds which provide unsurpassed image clarity. Processes that do not require silver have been developed for black and white photography, but they are not adaptable to color films (USBOM 1976). Other major users of silver are: electrical and electronic components, 25%; sterlingware and electroplated silverware, 15%; and brazing alloys and solders, 8% (USBOM 1980). The remaining silver consumed includes the manufacture of jewelry, arts, and crafts, and use in medicines, dentistry, mirror backing, bearings, catalysts, coinage, and nuclear control rods (USBOM 1976).

Due to its economic and industrial importance, and the general lack of adequate low-cost substitutes, the United States and the rest of the free world are confronted with the long-range problem of a serious imbalance between consumption and new production (Brobst and Pratt 1973). In 1979, estimated U.S. imports of silver amounted to 45% of consumption, and, as of 1973, a major worldwide imbalance of more than 100 million ounces of silver per year existed between production and consumption. The deficit between domestic production and consumption formerly was partly filled by releases from U.S. Treasury stocks, but these reserves are now depleted. This deficit must be made up from liquidation of private stocks, reclaimed silver, imports, increased new production, or use of substitutes for silver (Brobst and Pratt 1973).

Domestic silver production in 1979 was estimated at 38.3 million troy ounces. Major producing states were: Idaho, 48%; Arizona, 19%; Colorado, 8%; and Utah, Montana, and Missouri, 20% (USBOM 1980). Identified United States silver reserves are estimated to be 1.5 billion troy ounces. Geological evidence predicts another 4.2 billion ounces of other silver resources (USBOM 1976).

Depending on the characteristics of the deposit, silver is mined by open pit methods or subsurface shafts and drifts (USBOM 1976). Approximately 66% of primary silver production in the United States was a byproduct of copper, lead, and zinc mining (USBOM 1980). In fact, about two-thirds of the world's silver reserves and resources are a byproduct of copper, lead, zinc, and sulfide production, while veins in which silver is the main coproduct supply the remaining reserves and resources. Silver is also commonly found with gold, but this accounts for only 1% of domestic production. Within the United States, the only other important byproduct of silver mining is antimony, which is found in the Coeur d'Alene area in Idaho (USBOM 1976).

Map 11 (Figure 14). See section on Copper for discussion of the map data base.

Additional counties in Missouri containing silver deposits of concern to FWS but not shown on Map 11 are listed in Appendix C (R. Welford, FWS, Twin Cities, MN, pers. comm.).

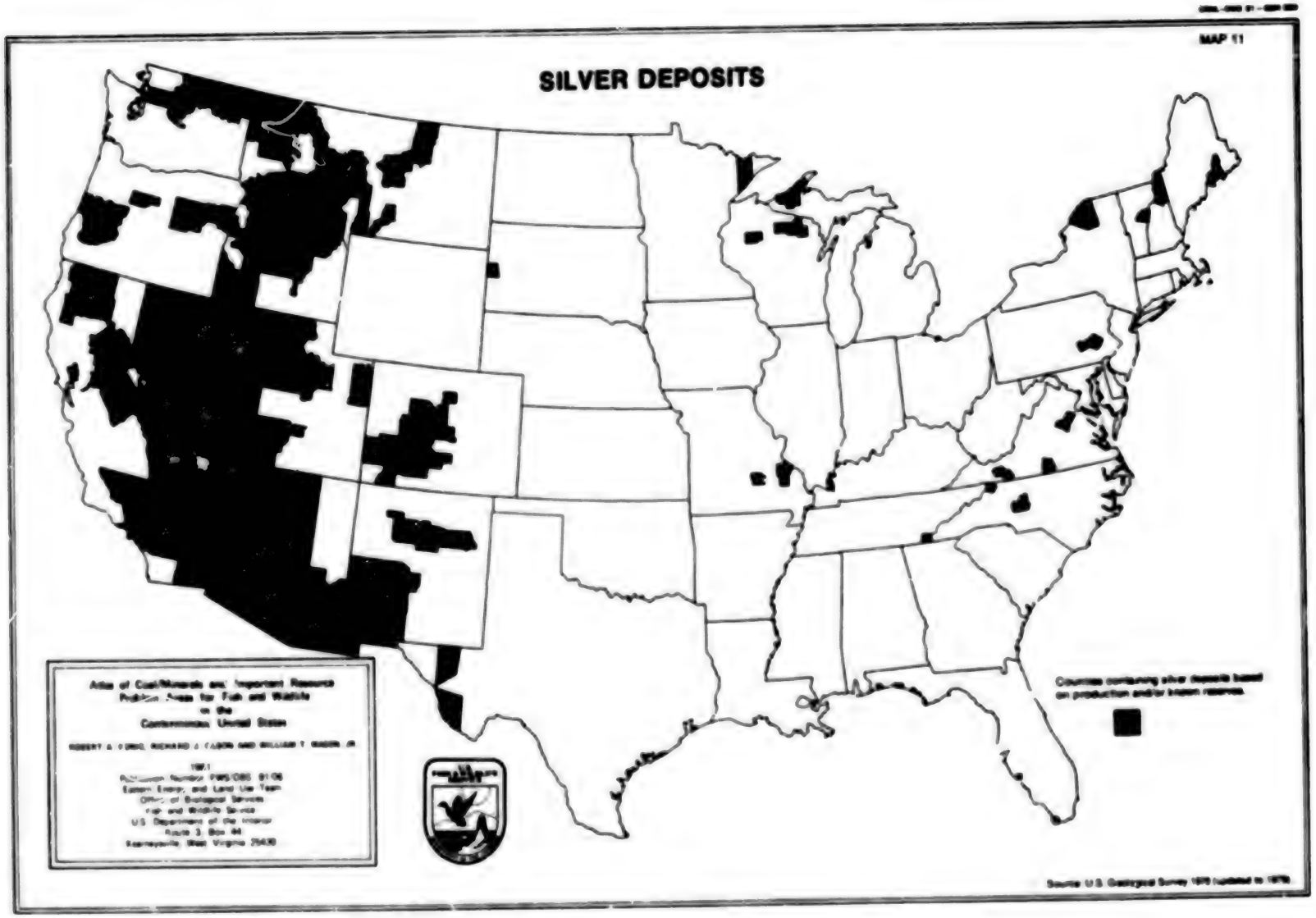

Figure 14. Counties containing silver deposits.

Uranium

Uranium is a silvery-white metal that consists of three semistable radioactive isotopes -- U^{238}, U^{235}, U^{234}. The fission of U^{235} releases large amounts of energy making it a very important energy source for use in nuclear reactors. One pound of U_3O_8 (processed ore) produces the heat equivalent of about eight tons of coal (Brobst and Pratt 1973). Byproducts and coproducts of uranium include vanadium, molybdenum, copper, gold, rare earths, and yttrium. Uranium is also a byproduct of wet-process phosphoric acid in phosphatic fertilizer production in central Florida (USBOM 1976).

At the end of 1971, the identified recoverable resources in the United States totaled 273,000 tons of U_3O_8. Domestic hypothetical recoverable resources as of that date are estimated to total about 500,000 tons. Other resources were deemed not economically recoverable by 1972 technologies (Brobst and Pratt 1973). Most known United States uranium resources are located in the west, as are all operating mills and mills planned for operation by 1983. Through 1977 the western portion of the U.S. has accounted for 99% of U_3O_8 production, 100% of the reserves, and 93% of the potential resources. Production for meeting uranium needs by the year 2000 will be centered primarily in New Mexico and Wyoming, and to a lesser extent in Utah (Horak and Olson 1980).

In general, uranium mining involves conventional open pit or underground mining techniques (USBOM 1976). These processes are estimated to account for 87% of U_3O_8 production in the year 2000, while solution mining is expected to account for 5%. It is estimated that mining of uranium up to the year 2000 will have disturbed approximately 53,100 hectares (132,750 acres). When exploration, milling, and tailings are included, the estimated total land disturbed will be 828,000 hectares (2,070,000 acres). However, 92% of this total will be from exploration and is considered minor and temporary (Horak and Olson 1980).

One of the breakdown products of U^{238} is Rn^{222}, a radioactive isotope of radon. Rn^{222} breaks down to metals which are easily deposited in the respiratory tract or otherwise absorbed by organisms. Radiation effects on the biota include mortality, chromosomal aberrations, and reduced fecundity. Ruminants are particularly susceptible to radioactive exposure from contaminated plants which can absorb radioactive substances via root systems or via atmospheric fallout. In addition selenium and vanadium from uranium mines can be accumulated by plants. Drinking water for wildlife may also contain elevated radioactivity (Horak and Olson 1980).

Precipitation on ore and waste rock piles and on exposed rock surfaces can produce runoff with leached uranium, radium, selenium, molybdenum, vanadium, increased acidity, and diverse salts (NAS 1979; Horak and Olson 1980).

In situ solution mining as practiced in several Texas and Wyoming operations (NAS 1979) should not directly affect aquatic resources as wastes are usually disposed of in bottom-sealed evaporation basins. However, aquatic resources potentially may be affected due to groundwater contamination via seeps and springs (Horak and Olson 1980). Radon in exhaust air from underground mines or wind-borne particulates from surface mines and waste piles may degrade air quality (NAS 1979). Dust may also contain radioactive uranium, thorium, and radium, and trace elements such as arsenic, lead, selenium, and vanadium. This may cause localized effects such as irritation of animal mucous membranes (Horak and Olson 1980).

Reclamation of lands in the west mined for uranium is hampered by low precipitation, high evaporation and transpiration, a short growing season, and poor soil. Uranium tailings are usually very fine and difficult to stabilize. Overburden or interburden spoils can be acidic making revegetation very difficult (NAS 1979).

Map 12 (Figure 15). Uranium resources were defined using the 1980 map compiled by the National Uranium Resource Evaluation (NURE) project (USDOE 1980, p. 15). The map shows locations of uranium deposits based on the reliability of the information. In this study, county occurrences of "probable and/or possible potential resources" were not included. Counties included contain either known reserves or potential resources. The potential resources include probable deposits (those occurring in known productive uranium areas) and possible deposits (those in which the formations or geological setting are favorable for uranium deposits) (USDOE 1980, p. 2). The resulting county-level map was compared against a map depicting productive uranium mines (SAI 1980c). There was generally good agreement except for some isolated occurrences and mines outside of the regions shown on the USDOE map.

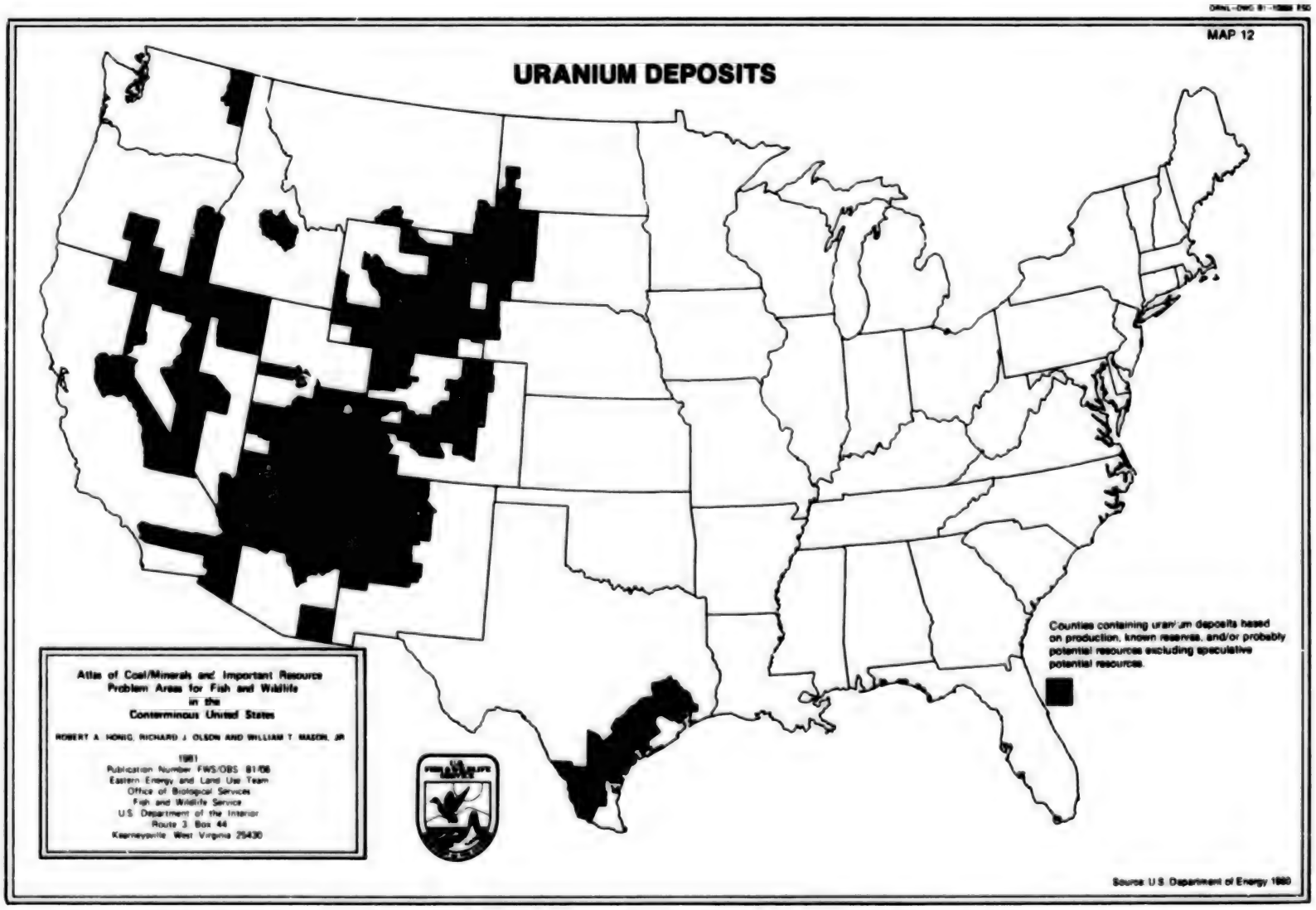

Figure 15. Counties containing uranium deposits.

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Appendix A

1980-81 U.S. FISH & WILDLIFE SERVICE IMPORTANT RESOURCE PROBLEMS (* IRP NOT INCLUDED IN THIS STUDY).

IRP		IRP_DESC
1		Steelhead Trout, Chinook & Sockeye Salmon - Columbia Basin
2		Endangered Species (several) - South Florida Wetlands & Keys
3		Endangered Bains and Tern - California Coastal Wetlands
4		Endangered Birds/Migratory Birds - Texas Gulf Coast
5		Migratory Waterfowl & Other Mig. Birds - Lower Miss. River
6		Migratory Waterfowl - N. Dakota, S. Dakota, Minn.
7		Migratory Waterfowl - Coastal Marshes Louisiana
8		Migratory Waterfowl - Central Valley California
9	*	Arctic & Am. Peregrine Falcon - N. Slope & Int. Alaska
10	*	Acid Rain Impacts - Nationwide
11		Freshwater Fishes & Fish Habitat - Great Lakes
12		Migratory Birds/Endangered Species - Nebraska
13		Endangered Fish - Upper and Lower Colo. River
14		Anadromous Fish (Striped Bass & Shad) - Chesapeake Bay
15	*	Migratory Birds - Lead Poisoning
16	*	Waterfowl Diseases (Avian Cholera & DVE) - Nationwide
17		Steelhead Trout & Chinook Salmon - Sacramento/San Joaquin Basins
18		Salmon & Steelhead Trout - Klamath Basin, N. Coast Streams, CA, OR
19		Endangered Birds (Bald Eagle) - Lower 48 States
20	*	Endangered Birds - Hawaiian & Trust Territories
21		Migratory Birds - Rio Grande Valley
22		Anadromous Fishes (PCB/PCBP) - Hudson River
23		Endangered Kirtlands Warbler
24		Endangered & Other Species - Barrier Islands, East & Gulf Coast
25		Endangered Species, Western Coal Development Impacts - West
26		Anadromous Fish, Atlantic Salmon and Shad - New England
27		Migratory Waterfowl, Diving Ducks - Atlantic & Miss. Flyways
28		Migratory Birds - Lower Colorado River Basin, Arizona
29		Black Duck - Coastal Mid-Atlantic
30		Endangered California Condor - S. Calif. Mountains & Valley
31		Migratory Waterfowl & Marine Birds - Coastal Washington & Oregon
32		Migratory Waterfowl - Coastal Marshes, NC and SC
33	*	Bald Eagle - Southeastern Alaska incl. Chilkat River Valley
34		Migratory Waterfowl, Category II - Great Lakes
35		Migratory Waterfowl & other Migr. Birds - Klamath Basin of OR & CA
36		Black Duck - New England
37	*	Marine Mammals - North Slope & Western Alaska
38		Endangered Species (several) - Coastal GA, SC & NC
39		Pacific Salmon, Steelhead - Puget Sound
40	*	Pacific Salmon - Southeast & Southcentral Alaska
41	*	Anadromous/Resident Freshwater Fishes - Alaska Pen./Bristol Bay
42	*	Migratory Waterfowl - North Slope/Beaufort Sea, Alaska
43	*	Exotic Fish Impact - Nationwide
44		Endangered Species, Cool- & Coldwater Fish - Cumberland Plateau
45	*	Migratory Waterfowl - N.E. Gulf of Alaska
46	*	Migratory Waterfowl/Marine Birds - Alaska Peninsula/Bristol Bay
47	*	Migratory Waterfowl - Yukon Flats/Upper Yukon River Basin
48	*	Migr. Waterfowl/Marine Birds - Yukon/Kuskovim Delta, S. Bering Sea
49		Estuarine & Anadromous Fish - NC, SC, FL, GA, MS, AL, & LA
50		Endangered Species - Mid-Gulf Drainage
51		Anadromous Fish - Mid-Atlantic
52		Migratory Waterfowl - Sandhills Area Groundwater Recharge NE
53		Waterfowl & Other Waterbirds - Stillwater Basin Nevada
54		Endangered Fishes - Truckee River Basin Nevada
55		Bottomland Hardwood End. Species & Migratory Waterfowl - FL & GA
56		Migratory Waterfowl, Marinebirds & Other Mig. Birds - Coastal CA
57		Migratory Waterfowl Habitat Losses - Rio Grande, Pecos Basins, NM
58		Waterfowl/Other Water Birds - Harney Basin, Oregon
59		Migratory Waterfowl - Playa Lakes
60		Endangered Fishes - Isolated Springs, AZ, TX, and NM
61		Migratory Waterfowl - Great Lakes Coastal Marshes, MI and OH
62	*	Marine Mammals - Southeast/Northern Gulf of Alaska
63		Migratory Birds - Yellowstone Basin
64	*	Porcupine Caribou Herd/Arctic Grizzly - North Slope AK
65		Endangered Mollusks and Finfish - Tennessee River Basin, VA
66		Endangered Mollusks - Upper Mississippi River
67		Golden Eagle - West Texas
68		Migratory Shorebird Staging Areas - Eastern Maine
69		Migratory Birds - Flathead River Basin
70		Prairie River Migratory Birds - James River, ND and SD
71		Greater Sandhill Crane - Indiana
72		Other Mig. Birds/Herons, Egrets, Gulls & Terns - Upper Miss. R.
73		Other Birds/Gulls, Terns, Herons & Egrets - Great Lakes
74	*	End. Species: Mammals, Birds, Herptiles - Puerto Rico, Virgin I.
75		Wintering Waterfowl, Shore & Wading Birds - Salton Sea
76		American Woodcock Population Decline - Northeast
77		Woodduck Nesting Habitat
78	*	International Fish & Wildlife Habitat Conservation & Research

Appendix B

1980-81 U.S. FISH & WILDLIFE SERVICE IMPORTANT RESOURCE PROBLEMS BY MAJOR AREAS CONCERN,

---------- TYPE=AMPHIBIANS & REPTILES ----------

IRP	IRP_DESC
2	Endangered Species (several) - South Florida Wetlands & Keys
20	Endangered & Other Species - Barrier Islands, East & Gulf Coast
30	Endangered Species (several) - Coastal GA, SC & NC
50	Endangered Species - Mid-Gulf Drainage
55	Bottomland Hardwood End. Species & Migratory Waterfowl - FL & GA

---------- TYPE=BIRDS ----------

IRP	IRP_DESC
2	Endangered Species (several) - South Florida Wetlands & Keys
3	Endangered Gulls and Tern - California Coastal Wetlands
4	Endangered Birds/Migratory Birds - Texas Gulf Coast
5	Migratory Waterfowl & Other Mig. Birds - Lower Miss. River
6	Migratory Waterfowl - N. Dakota, S. Dakota, Minn.
7	Migratory Waterfowl - Coastal Marshes Louisiana
8	Migratory Waterfowl - Central Valley California
12	Migratory Birds/Endangered Species - Nebraska
19	Endangered Birds (Bald Eagle) - Lower 48 States
21	Migratory Birds - Rio Grande Valley
23	Endangered Kirtlands Warbler
24	Endangered & Other Species - Barrier Islands, East & Gulf Coast
25	Endangered Species, Western Coal Development Impacts - West
27	Migratory Waterfowl, Diving Ducks - Atlantic & Miss. Flyways
28	Migratory Birds - Lower Colorado River Basin, Arizona
29	Black Duck - Coastal Mid-Atlantic
30	Endangered California Condor - S. Calif. Mountains & Valley
31	Migratory Waterfowl & Marine Birds - Coastal Washington & Oregon
32	Migratory Waterfowl - Coastal Marshes, NC and SC
34	Migratory Waterfowl, Category II - Great Lakes
35	Migratory Waterfowl & other Migr. Birds - Klamath Basin of OR & CA
36	Black Duck - New England
39	Endangered Species (several) - Coastal GA, SC & NC
44	Endangered Species, Cool- & Coldwater Fish - Cumberland Plateau
50	Endangered Species - Mid-Gulf Drainage
52	Migratory Waterfowl - Sandhills Area Groundwater Recharge MS
53	Waterfowl & Other Waterbirds - Stillwater Basin Nevada
55	Bottomland Hardwood End. Species & Migratory Waterfowl - FL & GA
56	Migratory Waterfowl, Marshbirds & Other Mig. Birds - Coastal CA
57	Migratory Waterfowl Habitat Losses - Rio Grande, Pecos Basins, NM
58	Waterfowl/Other Water Birds - Harney Basin, Oregon
59	Migratory Waterfowl - Playa Lakes
61	Migratory Waterfowl - Great Lakes Coastal Marshes, MI and OH
63	Migratory Birds - Yellowstone Basin
67	Golden Eagle - West Texas
68	Migratory Shorebird Staging Areas - Eastern Maine
69	Migratory Birds - Flathead River Basin
70	Prairie River Migratory Birds - James River, ND and SD
71	Greater Sandhill Crane - Indiana
72	Other Mig. Bi. Ga/Herons, Egrets, Gulls & Terns - Upper Miss. R.
73	Other Birds/Gulls, Terns, Herons & Egrets - Great Lakes
75	Wintering Waterfowl, Shore & Wading Birds - Salton Sea
76	American Woodcock Population Decline - Northeast
77	Woodduck Nesting Habitat

---------- TYPE=FISHES ----------

IRP	IRP_DESC
1	Steelhead Trout, Chinook & Sockeye Salmon - Columbia Basin
11	Freshwater Fishes & Fish Habitat - Great Lakes
12	Migratory Birds/Endangered Species - Nebraska
13	Endangered Fish - Upper and Lower Colo. River
16	Anadromous Fish (Striped Bass & Shad) - Chesapeake Bay
17	Steelhead Trout & Chinook Salmon - Sacramento/San Joaquin Basins
18	Salmon & Steelhead Trout - Klamath Basin, N. Coast Streams, CA, OR
22	Anadromous Fishes (PCB/PCBP) - Hudson River
24	Endangered & Other Species - Barrier Islands, East & Gulf Coast
25	Endangered Species, Western Coal Development Impacts - West
26	Anadromous Fish, Atlantic Salmon and Shad - New England
39	Pacific Salmon, Steelhead - Puget Sound
44	Endangered Species, Cool- & Coldwater Fish - Cumberland Plateau
49	Potomac & Anadromous Fish - DC, MD, PA, WV, VA, DE, & LA
50	Endangered Species - Mid-Gulf Drainage
51	Anadromous Fish - Mid-Atlantic
54	Endangered Fishes - Truckee River Basin Nevada
55	Bottomland Hardwood End. Species & Migratory Waterfowl - FL & GA
60	Endangered Fishes - Isolated Springs, AZ, TX, and NM
65	Endangered Mollusks and Fishes - Tennessee River Basin, VA
69	Migratory Birds - Flathead River Basin

---------- TYPE=INVERTEBRATES ----------

IRP	IRP_DESC
24	Endangered & Other Species - Barrier Islands, East & Gulf Coast
44	Endangered Species, Cool- & Coldwater Fish - Cumberland Plateau
50	Endangered Species - Mid-Gulf Drainage
65	Endangered Mollusks and Fishes - Tennessee River Basin, VA

APPENDIX B. 1980-81 U.S. FISH & WILDLIFE SERVICE IMPORTANT RESOURCE PROBLEMS BY MAJOR ANIMAL CONCERN.

---------- TYPE=INVERTEBRATES ----------

IRP	IRP_DESC
66	Endangered Mollusks - Upper Mississippi River

---------- TYPE=MAMMALS ----------

IRP	IRP_DESC
2	Endangered Species (several) - South Florida Wetlands & Keys
24	Endangered & Other Species - Barrier Islands, East & Gulf Coast
25	Endangered Species, Western Coal Development Impacts - West
38	Endangered Species (several) - Coastal GA, SC & NC
44	Endangered Species, Cool- & Coldwater Fish - Cumberland Plateau
50	Endangered Species - Mid-Gulf Drainage
55	Bottomland Hardwood End. Species & Migratory Waterfowl - FL & GA
69	Migratory Birds - Flathead River Basin

Appendix C

Counties in the conterminous United States and associated IRPs and minerals. "X" indicates the presence of a mineral deposit based on the primary data source(s) for a given map; "*" indicates other deposits of concern to FWS.

Minerals: COAL (1 = <1,000 tons, 2 = 1,000-100,000 tons, 3 = >100,000 tons); CU = copper; G_T = geothermal resources (1 = >150°C, 2 = 90-150°C, 3 = <90°C); AU = gold; FE = iron; MO = molybdenum; NI = nickel; O_S = oil shale/tar sands (1 = oil shale, 2 = tar sands, 3 = both); PEAT (1 = Class I resource, 2 = Class II resource); P = phosphate; AG = silver; U = uranium.

FIPS STATE NUMBER and FIPS_CO are Federal Information Processing Standards state and county code numbers, respectively.

FIPS STATE NUMBER=01 STATE=ALABAMA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	AUTAUGA	89													001
003	BALDWIN	28													003
		89													
		50													
005	BARBOUR	89	2												005
007	BIBB		*				X			1					007
009	BLOUNT		1							1					C09
011	BULLOCK	89													011
013	BUTLER		*												C13
015	CALHOUN														C15
017	CHAMBERS														C17
019	CHEROKEE		*												019
021	CHILTON	89													021
023	CHOCTAW	89	2												C23
025	CLARKE	89	*												025
027	CLAY			X			X	X							027
029	CLEBURNE			X		X									C29
031	COFFEE	89	2												C31
033	COLBERT	88								2					C33
035	CONECUH	89	*												C35
037	COOSA	89													C37
039	COVINGTON	89													039
041	CRENSHAW	89	2												041
043	CULLMAN		2							2					C43
045	DALE	89	1												045
047	DALLAS	89													047
049	DE KALB	88	1							1					C49
		65													
051	ELMORE	89													C51
053	ESCAMBIA	89													C53
055	ETOWAH		*							1					C55
057	FAYETTE		2												C57
059	FRANKLIN	88	*				X			2					059
061	GENEVA	89													061
063	GREENE	89													063
065	HALE														065
067	HENRY		*												C67
069	HOUSTON														C69
071	JACKSON	88	2				X			1					C71
		65													
073	JEFFERSON		2				X			1					C73
075	LAMAR		*												075
077	LAUDERDALE	88								1					077
		65													
079	LAWRENCE	88	*							2					C79
081	LEE														081
083	LIMESTONE	88								1					C83
085	LOWNDES	89													C85
087	MACON	89													C87
089	MADISON	88	*							1					C89
091	MARENGO	89	2												C91
093	MARION		2												C93
095	MARSHALL	88	*				X			1					C95
097	MOBILE	28													C97
		89													
		50													
099	MONROE	89	*												C99
101	MONTGOMERY	89													101
103	MORGAN	88	*							2					103
105	PERRY														105
107	PICKENS														107
109	PIKE	89	2												109
111	RANDOLPH														111
113	RUSSELL														113
115	ST CLAIR	89	1							1					115
117	SHELBY	89	1												117
119	SUMTER	89	1												119
121	TALLADEGA	89					X								121
123	TALLAPOOSA	89				X									123
125	TUSCALOOSA		2												125
127	WALKER		2												127
129	WASHINGTON	89													129
131	WILCOX	89	2												131
133	WINSTON		1												133

FIPS STATE NUMBER=04 STATE=ARIZONA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	APACHE	13	2		3									X	C01
		25													
		28													
003	COCHISE	13		X	2	X		X					X	X	003
		60													
005	COCONINO	13	2	X				X					X	X	005
		28													
007	GILA	13		X	3	X	X	X					X	X	007
		28													
009	GRAHAM	13		X	2			X					X		C09
		28													
		60													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=04 STATE=ARIZONA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
011	GREENLEE	13		X	2	X		X					X		011
		28													
013	MARICOPA	13		X	1	X	X						X		C13
		28													
015	MOHAVE	13		X	3	X		X					X	X	015
		28													
017	NAVAJO	13	2				X	X						X	C17
		25													
		28													
019	PIMA	13		X	3	X		X					X		019
		60													
021	PINAL	13		X	3	X	X	X					X		C21
		28													
023	SANTA CRUZ	13		X		X		X					X		C23
		60													
025	YAVAPAI	13		X	3	X	X	X					X	X	C25
		28													
027	YUMA	13		X	3	X	X						X	X	C27
		28													

FIPS STATE NUMBER=05 STATE=ARKANSAS

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	ARKANSAS	5	*												C01
003	ASHLEY	5	*												003
005	BAXTER														C05
007	BENTON									1					C07
009	BOONE									1					C09
011	BRADLEY	5	1												011
013	CALHOUN	5	1												C13
015	CARROLL									1					015
017	CHICOT	5	*												017
		69													
019	CLARK	5	1												C19
021	CLAY	5	*												021
023	CLEBURNE														023
025	CLEVELAND	5	1				X								C25
027	COLUMBIA	5	*												027
029	CONWAY														C29
031	CRAIGHEAD	5	*												C31
033	CRAWFORD		2												C33
035	CRITTENDEN	5	*												C35
037	CROSS	5	*												C37
039	DALLAS	5	1												C39
041	DESHA	5	*												C41
		69													
043	DREW	5	*												C43
045	FAULKNER	5													C45
047	FRANKLIN		2												C47
049	FULTON														C49
051	GARLAND	5								1					C51
053	GRANT	5	1												053
055	GREENE	5	1												055
057	HEMPSTEAD	5	*												C57
059	HOT SPRING	5	1				X			1					059
061	HOWARD	5													061
063	INDEPENDENCE	5	*							1					C63
065	IZARD														C65
067	JACKSON	5	*												C67
069	JEFFERSON	5	*												C69
071	JOHNSON		2												C71
073	LAFAYETTE		*												C73
075	LAWRENCE	5	*												C75
077	LEE	5	*												C77
079	LINCOLN	5	*												C79
081	LITTLE RIVER	5													081
083	LOGAN		2												C83
085	LONOKE	5	*												C85
087	MADISON									1					087
089	MARION														C89
091	MILLER		*												C91
093	MISSISSIPPI	5	*												C93
095	MONROE	5	*												C95
097	MONTGOMERY	5								1					C97
099	NEVADA	5	1												C99
101	NEWTON									1					101
103	OUACHITA	5	1												103
105	PERRY														105
107	PHILLIPS	5	*												107
109	PIKE	5													109
111	POINSETT	5	1												111
113	POLK									1					113
115	POPE		2												115
117	PRAIRIE	5	*												117
119	PULASKI	5	2												119
121	RANDOLPH		*												121
123	ST FRANCIS	5	*												123
125	SALINE	5	1							1					125
127	SCOTT		2												127
129	SEARCY									1					129

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=05 STATE=ARKANSAS

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PHAT	P	AG	U	FIPS_CO
131	SEBASTIAN		2												131
133	SEVIER	5													133
135	SHARP														135
137	STONE									1					137
139	UNION	5	*												139
141	VAN BUREN														141
143	WASHINGTON									1					143
145	WHITE	5	*												145
147	WOODRUFF	5	*												147
149	YELL														149

FIPS STATE NUMBER=06 STATE=CALIFORNIA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PHAT	P	AG	U	FIPS_CO
001	ALAMEDA	3													C01
		8													
		17													
		56													
003	ALPINE	17			2								X	X	003
005	AMADOR	17		X		X							X	X	005
007	BUTTE	8				X							X		C07
		17													
009	CALAVERAS	17		X		X							X	X	C09
011	COLUSA	8			2										C11
		17													
013	CONTRA COSTA	3													013
		8													
		17													
015	DEL NORTE	18				X			X						015
		56													
017	EL DORADO	17				X							X	X	017
019	FRESNO	8		X		X									C19
		30													
021	GLENN	8													C21
		17													
023	HUMBOLDT	18				X									023
		56													
025	IMPERIAL	28			1	X							X		C25
		75													
027	INYO	30		X	1	X		X					X	X	027
029	KERN	8			2	X				2			X		C29
		30													
031	KINGS	8													031
		30													
033	LAKE				1										C33
035	LASSEN	17			2	X									035
037	LOS ANGELES	3				X	X						X		C37
		30													
		56													
039	MADERA	8					X								C39
		17													
		30													
041	MARIN	3													C41
		17													
		56													
043	MARIPOSA	17				X							X		C43
		30													
045	MENDOCINO	56							X	2					C45
047	MERCED	8				X									C47
		17													
		30													
049	MODOC	18			1	X								X	C49
		35													
051	MONO				1	X							X	X	C51
053	MONTEREY	3													053
		30													
		56													
055	NAPA	3			2	X							X		055
057	NEVADA	17				X							X		057
		56													
059	ORANGE	3											X		C59
		56													
061	PLACER	8		X		X							X		C61
		17													
		56													
063	PLUMAS	17		X	1	X							X		C63
065	RIVERSIDE	28			2	X	X						X	X	065
		75													
067	SACRAMENTO	3				X							X		C67
		8													
		17													
069	SAN BENITO	30				X									C69
071	SAN BERNARDINO	28			1	X	X						X		C71
073	SAN DIEGO	3			3	X			X						C73
		56													
		75													
075	SAN FRANCISCO	3													C75
		17													
		56													
077	SAN JOAQUIN	8				X									C77

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=06 STATE=CALIFORNIA

FIPS_CC	COUNTY	IRP	COAL	CU	G_T	AU	PE	MO	HI	O_S	PEAT	P	AG	U	FIPS_CC
		17													
079	SAN LUIS OBISPO	3			3					2					C79
		30													
		56													
081	SAN MATEO	3								2					C81
		56													
083	SANTA BARBARA	3								2					C83
		30													
		56													
085	SANTA CLARA	8								2					C85
		30													
		56													
087	SANTA CRUZ	3								2					C87
		30													
		56													
089	SHASTA	8		X	2	X	X						X		C89
		17													
		18													
091	SIERRA	17			2	X							X		C91
		58													
093	SISKIYOU	18		X		X							X		C93
		35													
095	SOLANO	3													C95
		8													
		17													
097	SONOMA	3			2										C97
		17													
		56													
099	STANISLAUS	8				X									C99
		17													
101	SUTTER	8													101
		17													
103	TEHAMA	8			1										103
		17													
		18													
105	TRINITY	18		X		X							X		105
107	TULARE	8				X									107
		30													
109	TUOLUMNE	17				X							X	X	109
111	VENTURA	3			2										111
		30													
		56													
113	YOLO	8													113
		17													
115	YUBA	8				X							X		115
		17													

FIPS STATE NUMBER=08 STATE=COLORADO

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	MO	HI	O_S	PEAT	P	AG	U	FIPS_CC
001	ADAMS	25	2			X								X	001
003	ALAMOSA				2										C03
005	ARAPAHOE	25	2											X	C05
007	ARCHULETA	13	2		3										007
		25													
009	BACA	59													C09
011	BENT	59													C11
013	BOULDER	25	2			X	X	X					X	X	013
015	CHAFFEE			X	2	X	X	X					X	X	C15
017	CHEYENNE	59													C17
019	CLEAR CREEK	25		X		X	X	X					X		C19
021	CONEJOS	25			3										C21
023	COSTILLA	25			3		X								C23
025	CROWLEY	25													C25
		59													
027	CUSTER	25				X	X						X		C27
029	DELTA	13	2				X			1					C29
		25													
031	DENVER	25													C31
033	DOLORES	13		X	1	X	X						X	X	033
		25													
035	DOUGLAS	25	1											X	C35
037	EAGLE	13		X		X	X						X		037
		25													
039	ELBERT	25	2											X	C39
041	EL PASO	25	2				X							X	C41
043	FREMONT	25	2		3		X							X	043
045	GARFIELD	13	2		3					1					045
		25													
047	GILPIN	25		X		X		X					X		C47
049	GRAND	13													C49
		25													
051	GUNNISON	13	2	X	2	X	X	X					X	X	C51
		25													
053	HINSDALE	13		X									X		C53
		25													
055	HUERFANO	25	2												C55
057	JACKSON	13	2					X							C57
		25													
059	JEFFERSON	25	2			X		X						X	C59

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=08 STATE=COLORADO

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PB	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
061	KIOWA	59													061
063	KIT CARSON	59													063
065	LAKE	25		X		X		X					X		065
067	LA PLATA	13	2	X	3	X							X	X	067
		25													
069	LARIMER	25						X							069
071	LAS ANIMAS	25	2												071
		59													
073	LINCOLN	25													073
075	LOGAN														075
077	MESA	13	2							1				X	077
		25													
079	MINERAL	13			2	X		X					X		079
		25													
081	MOFFAT	13	3				X			1				X	081
		25													
083	MONTEZUMA	13	2											X	083
		25													
085	MONTROSE	13	2	X									X	X	085
		25													
087	MORGAN	25												X	087
089	OTERO	25													089
		59													
091	OURAY	13	2	X		X	X	X					X		091
		25													
093	PARK	25	2			X		X					X	X	093
095	PHILLIPS														095
097	PITKIN	13	2		2	X		X					X		097
		25													
099	PROWERS	59													099
101	PUEBLO	25					X							X	101
103	RIO BLANCO	13	3							1				X	103
		25													
105	RIO GRANDE			X	3	X							X		105
107	ROUTT	13	3		2	X		X							107
		25													
109	SAGUACHE	25		X	2	X	X						X	X	109
111	SAN JUAN	13		X		X							X		111
		25													
113	SAN MIGUEL	13		X		X	X						X	X	113
		25													
115	SEDGWICK														115
117	SUMMIT	13				X	X	X					X		117
		25													
119	TELLER	25				X							X	X	119
121	WASHINGTON														121
123	WELD	25	2											X	123
125	YUMA														125

FIPS STATE NUMBER=09 STATE=CONNECTICUT

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PB	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	FAIRFIELD	22													C01
		36													
003	HARTFORD	22		X				X							C03
		26													
		36													
005	LITCHFIELD	22							X						C05
		36													
007	MIDDLESEX	22							X						007
		26													
		36													
009	NEW HAVEN	22													C09
		36													
011	NEW LONDON	26													C11
		36													
013	TOLLAND	26													013
		36													
015	WINDHAM	36													C15

FIPS STATE NUMBER=10 STATE=DELAWARE

FIPS_CC	COUNTY	IRP	COAL	CU	G_T	AU	PB	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	KENT	19													001
		51													
003	NEW CASTLE	19													C03
		27													
		51													
005	SUSSEX	19													C05
		24													
		51													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=11 STATE=WASH., D. C.

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	WASHINGTON	14													C01
		19													
		76													

FIPS STATE NUMBER=12 STATE=FLORIDA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ALACHUA											X			C01
003	BAKER	55									2				C03
005	BAY	24													C05
		49													
		50													
007	BRADFORD											X			C07
009	BREVARD	2									1				C09
		24													
		49													
011	BROWARD	2									1				C11
		24													
		49													
013	CALHOUN	49													C13
		50													
		55													
015	CHARLOTTE	2									1				C15
		24													
		49													
017	CITRUS	2									2				C17
		49													
019	CLAY	2										X			C19
		49													
021	COLLIER	2									1				C21
		49													
023	COLUMBIA	49									2	X			C23
		55													
025	DADE	2									1				C25
		24													
		49													
027	DE SOTO	2									1				C27
		49													
029	DIXIE	2									2				C29
		49													
031	DUVAL	2													C31
		24													
		49													
033	ESCAMBIA	24													C33
		49													
		50													
035	FLAGLER	2													C35
		24													
		49													
037	FRANKLIN	24													C37
		49													
		50													
		55													
039	GADSDEN	49													C39
		55													
041	GILCHRIST	49									2				C41
043	GLADES	2									1				C43
045	GULF	24													C45
		49													
		50													
047	HAMILTON	49									2	X			C47
		55													
049	HARDEE	2									1				C49
		49													
051	HENDRY	2									1				C51
053	HERNANDO	2									2				C53
		49													
055	HIGHLANDS	2									1				C55
057	HILLSBOROUGH	2													C57
		49													
059	HOLMES	49													C59
061	INDIAN RIVER	2									1				C61
		24													
		49													
063	JACKSON	49													C63
		55													
065	JEFFERSON	49									2				C65
		50													
067	LAFAYETTE	49									2				C67
		55													
069	LAKE	2									2				C69
		49													
071	LEE	2									1				C71
		24													
		49													
073	LEON	49													C73
		50													
075	LEVY	2									2	X			C75
		49													
077	LIBERTY	49													C77

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=12 STATE=FLORIDA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
		50													
		55													
079	MADISON	49													079
		55													
081	MANATEE	2									1				C81
		28													
		49													
083	MARION	2									2				C83
085	MARTIN	2									1				C85
		28													
		49													
087	MONROE	2									1				C87
		28													
		49													
089	NASSAU	28													C89
		49													
091	OKALOOSA	28													C91
		49													
		50													
093	OKEECHOBEE	2									1				C93
095	ORANGE	2									1				095
		49													
097	OSCEOLA	2									1				C97
099	PALM BEACH	2									1				C99
		28													
		49													
101	PASCO	2									2				101
		28													
		49													
103	PINELLAS	2													103
		28													
		49													
105	POLK	2									2	X			105
107	PUTNAM	2										X			107
		49													
109	ST JOHNS	2													109
		28													
		49													
111	ST LUCIE	2									1				111
		28													
		49													
113	SANTA ROSA	28													113
		49													
		50													
115	SARASOTA	2									1				115
		28													
		49													
117	SEMINOLE	2													117
		49													
119	SUMTER	2									2				119
121	SUWANNEE	49									2				121
		55													
123	TAYLOR	49									2				123
		50													
		55													
125	UNION														125
127	VOLUSIA	2													127
		28													
		49													
129	WAKULLA	28									2				129
		49													
		50													
131	WALTON	28													131
		49													
		50													
133	WASHINGTON	49													133
		50													

FIPS STATE NUMBER=13 STATE=GEORGIA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	APPLING	49			1										C01
		55													
003	ATKINSON														C03
005	BACON	55													C05
007	BAKER	49													C07
009	BALDWIN														C09
011	BANKS														C11
013	BARROW														C13
015	BARTOW						X								C15
017	BEN HILL														C17
019	BERRIEN											X			C19
021	BIBB														C21
023	BLECKLEY														C23
025	BRANTLEY	49			1										C25
		55													
027	BROOKS														C27
029	BRYAN	28			1							X			C29
		38													
		49													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=13 STATE=GEORGIA

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PERT	P	AG	U	FIPS_CO
		55													
031	BULLOCH	49			1										C31
033	BURKE	55													C33
035	BUTTS														035
037	CALHOUN														C37
039	CANDEN	20													C39
		30													
		49													
		55													
043	CANDLER	55			1										C43
045	CARROLL														C45
047	CATOOSA	49								1					C47
		65													
049	CHARLTON	49													C49
		55													
051	CHATHAM	20										X			C51
		30													
		49													
		55													
053	CHATTAHOOCHEE														C53
055	CHATTOOGA	65	*							1					C55
057	CHEROKEE					X									C57
059	CLARKE														C59
061	CLAY														C61
063	CLAYTON														C63
065	CLINCH	49										X			065
		55													
067	COBB														C67
069	COFFEE	55													C69
071	COLQUITT														C71
073	COLUMBIA														C73
075	COOK														075
077	COWETA											X			077
079	CRAWFORD														C79
081	CRISP														C81
083	DADE	44	1							1					C83
		65													
085	DAWSON														C85
087	DECATUR	49													C87
089	DE KALB														C89
091	DODGE														C91
093	DOOLY														C93
095	DOUGHERTY	49													C95
097	DOUGLAS														C97
099	EARLY														C99
101	ECHOLS	49										X			101
		55													
103	EFFINGHAM	49													103
		55													
105	ELBERT														105
107	EMANUEL	55			1										107
109	EVANS	55			1										109
111	FANNIN	65		X											111
113	FAYETTE														113
115	FLOYD	65								1					115
117	FORSYTH														117
119	FRANKLIN														119
121	FULTON														121
123	GILMER	65													123
125	GLASCOCK														125
127	GLYNN	20			1										127
		30													
		49													
		55													
129	GORDON	65								1					129
131	GRADY	49													131
133	GREENE														133
135	GWINNETT														135
137	HABERSHAM														137
139	HALL														139
141	HANCOCK														141
143	HARALSON			X											143
145	HARRIS														145
147	HART														147
149	HEARD														149
151	HENRY														151
153	HOUSTON														153
155	IRWIN														155
157	JACKSON														157
159	JASPER														159
161	JEFF DAVIS	55													161
163	JEFFERSON														163
165	JENKINS	49													165
167	JOHNSON	55													167
169	JONES														169
171	LAMAR														171
173	LANIER											X			173
175	LAURENS	55													175
177	LEE	49													177
179	LIBERTY	20			1										179
		30													
		49													

APPENDIX C (CONTINUED)

VIPS STATE NUMBER=13 STATE=GEORGIA

VIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	VIPS_CO
181	LINCOLN														181
183	LONG	49			1										183
		55													
185	LOWNDES											X			185
187	LUMPKIN			X		X									187
189	MCDUFFIE														189
191	MCINTOSH	24			1										191
		38													
		49													
		55													
193	MACON														193
195	MADISON														195
197	MARION														197
199	MERIWETHER														199
201	MILLER	49													201
205	MITCHELL	49													205
207	MONROE														207
209	MONTGOMERY	55			1										209
211	MORGAN														211
213	MURRAY	65													213
217	NEWTON														217
219	OCONEE														219
221	OGLETHORPE														221
223	PAULDING			X											223
225	PEACH														225
227	PICKENS	65													227
229	PIERCE	55			1										229
231	PIKE														231
233	POLK									1					233
235	PULASKI														235
237	PUTNAM														237
239	QUITMAN														239
241	RABUN														241
243	RANDOLPH														243
245	RICHMOND														245
247	ROCKDALE														247
249	SCHLEY														249
251	SCREVEN	49													251
		55													
253	SEMINOLE	49													253
255	SPALDING														255
257	STEPHENS														257
259	STEWART						X								259
261	SUMTER														261
263	TALBOT														263
265	TALIAFERRO														265
267	TATTNALL	49			1										267
		55													
269	TAYLOR														269
271	TELFAIR														271
273	TERRELL														273
275	THOMAS	49													275
277	TIFT														277
279	TOOMBS	55			1										279
281	TOWNS														281
283	TREUTLEN	55			1										283
285	TROUP														285
287	TURNER														287
289	TWIGGS														289
291	UNION														291
293	UPSON														293
295	WALKER	46	1				X			1					295
		65													
297	WALTON														297
299	WARE	49													299
		55													
301	WARREN														301
303	WASHINGTON														303
305	WAYNE	49			1										305
		55													
307	WEBSTER						X								307
309	WHEELER	55			1										309
311	WHITE					X									311
313	WHITFIELD	65					X			1					313
315	WILCOX														315
317	WILKES			X											317
319	WILKINSON														319
321	WORTH	49													321
510	COLUMBUS														510

VIPS STATE NUMBER=16 STATE=IDAHO

VIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	VIPS_CO
001	ADA				3	X									001
003	ADAMS	1		X	2			X							003
005	BANNOCK														005
007	BEAR LAKE														007
009	BENEWAH														009
011	BINGHAM					X									011
013	BLAINE	1		X	2	X							X		013

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=16 STATE=IDAHO

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
015	BOISE	1			2	X		X					X		C15
017	BONNER							X					X		C17
019	BONNEVILLE					X									C19
021	BOUNDARY							X					X		C21
023	BUTTE												X		C23
025	CAMAS				2	X							X		C25
027	CANYON				3										C27
029	CARIBOU				3							X			C29
031	CASSIA				2	X									C31
033	CLARK												X		C33
035	CLEARWATER	1				X	X								C35
037	COSTER	1		X	2	X		X					X	X	C37
039	ELMORE	1			2	X		X					X		C39
041	FRANKLIN				2										C41
043	FREMONT				2										C43
045	GEM				2	X							X		C45
047	GOODING				2										C47
049	IDAHO	1			2	X		X					X		C49
051	JEFFERSON														C51
053	JEROME				3	X									C53
055	KOOTENAI												X		C55
057	LATAH	1				X									C57
059	LEMHI	1		X	1	X	X	X					X		C59
061	LEWIS	1													C61
063	LINCOLN														C63
065	MADISON				2										C65
067	NEZ PERCE														C67
069	ONEIDA	1													C69
071	OWYHEE														C71
073	PAYETTE				2	X							X		C73
075	POWER				3										C75
077	SHOSHONE					X									C77
079	TETON			X		X			X				X		C79
081	TWIN FALLS														C81
083	VALLEY				2	X									C83
085	WASHINGTON	1			2	X		X					X		C85
087					1		X	X					X		C87

FIPS STATE NUMBER=17 STATE=ILLINOIS

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ADAMS	19	2							1					C01
		27													
		66													
		72													
		77													
003	ALEXANDER	5													C03
		19													
		66													
		72													
		77													
005	BOND	19	3												C05
		77													
007	BOONE	77													C07
009	BROWN	19	2												C09
		66													
		77													
011	BUREAU	66	3												C11
		77													
013	CALHOUN	19	1							1					C13
		27													
		66													
		72													
		77													
015	CARROLL	19													C15
		27													
		66													
		72													
		77													
017	CASS	19	2												C17
		66													
		77													
019	CHAMPAIGN	77								1					C19
021	CHRISTIAN	77	3												C21
023	CLARK	77	2												C23
C25	CLAY	77													C25
027	CLINTON	19	3												C27
		77													
029	COLES	77	2												C29
031	COOK	11													C31
		36													
		73													
		77													
033	CRAWFORD	77	2												C33
035	CUMBERLAND	77	1												C35
037	DE KALB	77													C37
039	DE WITT	77													C39
041	DOUGLAS	77	2							1					C41
043	DU PAGE	36													C43
		77													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=17 STATE=ILLINOIS

FIPS_CO	COUNTY	IMP	COAL	CH	G_T	AG	FR	MO	NI	O_S	PEAT	P	AA	S	FIPS_CC
045	EDGAR	77	3												C45
047	EDWARDS	77	2												C47
049	EFFINGHAM	77													C49
051	FAYETTE	19	3												C51
		77													
053	FORD	77													C53
055	FRANKLIN	77	3												C55
057	FULTON	19	3												C57
		66													
		77													
059	GALLATIN	19	3												C59
		77													
061	GREENE	19	2							1					C61
		66													
		77													
063	GRUNDY	77	2												C63
065	HAMILTON	77	3												C65
067	HANCOCK	19	2												C67
		27													
		66													
		72													
		77													
069	HARDIN	19											2		C69
		77													
071	HENDERSON	19								1					C71
		27													
		66													
		72													
		77													
073	HENRY	77	2												C73
075	IROQUOIS	77								1					C75
077	JACKSON	19	2												C77
		66													
		72													
		77													
079	JASPER	77													C79
081	JEFFERSON	77	3												C81
083	JERSEY	19	2							1					C83
		27													
		66													
		72													
		77													
085	JO DAVIESS	19													C85
		27													
		66													
		72													
		77													
087	JOHNSON	77													C87
089	KANE	77													C89
091	KANKAKEE	77	2												C91
093	KENDALL	77													C93
095	KNOX	77	2												C95
097	LAKE	11													C97
		38													
		73													
		77													
099	LA SALLE	77	3												C99
101	LAWRENCE	77	2												101
103	LEE	77													103
105	LIVINGSTON	77	2												105
107	LOGAN	19	2												107
		77													
109	MCDONOUGH	77	2												109
111	MCHENRY	77													111
113	MCLEAN	77	2												113
115	MACON	77	2												115
117	MACOUPIN	77	3												117
119	MADISON	19	1												119
		27													
		66													
		72													
		77													
121	MARION	77	2												121
123	MARSHALL	19	2												123
		66													
		77													
125	MASON	19													125
		66													
		77													
127	MASSAC	5													127
		19													
		77													
129	MENARD	19	3												129
		77													
131	MERCER	19	2							1					131
		27													
		66													
		72													
		77													
133	MONROE	19	1												133
		66													
		72													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=17 STATE=ILLINOIS

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PZ	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
		77													
135	MONTGOMERY	77	3												135
137	MORGAN	39	2												137
		66													
		77													
139	MOULTRIE	39	2												139
		77													
141	OGLE	77													141
143	PEORIA	39	3												143
		66													
		77													
145	PERRY	77	3												145
147	PIATT	77													147
149	PIKE	39								1					149
		27													
		66													
		72													
		77													
151	POPE	39													151
		77													
153	POLASKI	5													153
		39													
		66													
		77													
155	PUTNAM	66	2												155
		77													
157	RANDOLPH	39	2												157
		66													
		72													
		77													
159	RICHLAND	77													159
161	ROCK ISLAND	39	2							1					161
		27													
		66													
		72													
		77													
163	ST CLAIR	39	3												163
		66													
		72													
		77													
165	SALINE	77	3												165
167	SANGAMON	77	3												167
169	SCHUYLER	39	2												169
		66													
		77													
171	SCOTT	39	2							1					171
		66													
		77													
173	SHELBY	39	2												173
		77													
175	STARK	77	2												175
177	STEPHENSON	77													177
179	TAZEWELL	39	2												179
		66													
		77													
181	UNION	39													181
		66													
		72													
		77													
183	VERMILION	77	3							1					183
185	WABASH	77	2												185
187	WARREN	77	2							1					187
189	WASHINGTON	39	3												189
		77													
191	WAYNE	77	2												191
193	WHITE	77	2												193
195	WHITESIDE	39													195
		27													
		66													
		72													
		77													
197	WILL	77	2												197
199	WILLIAMSON	77	3												199
201	WINNEBAGO	77													201
203	WOODFORD	39	2												203
		66													
		77													

FIPS STATE NUMBER=18 STATE=INDIANA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PZ	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	ADAMS	71													001
		77													
003	ALLEN	71													003
		77													
005	BARTHOLOMEW	71								1					005
		77													
007	BENTON	71								1					007
		77													
009	BLACKFORD	77													009

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=18 STATE=INDIANA

FIPS_CC	COUNTY	IMP	COAL	CH	G_T	AS	FE	NO	NI	O_S	PEAT	P	AG	S	FIPS_CC
011	BOONE	71								1					C11
		77													
013	BROWN	71					*			*					C13
		77													
015	CARROLL	71								1					C15
		77													
017	CASS	71					*								C17
		77													
019	CLARK	19					*			1					C19
		71													
		77													
021	CLAY	77	2				*			*					C21
023	CLINTON	71								1					C23
		77													
025	CRAWFORD	19								*					C25
		71													
		77													
027	DAVIESS	77	2				*			*					C27
029	DEARBORN	19													C29
		77													
031	DECATUR	77													C31
033	DE KALB	11								1					C33
		71													
		77													
035	DELAWARE	77													C35
037	DUBOIS	71	1				*			*					C37
		77													
039	ELKHART	11					*			1					C39
		71													
		77													
041	FAYETTE	77													C41
043	FLOYD	19					*			1					C43
		71													
		77													
045	FOUNTAIN	71	2				I			*					C45
		77													
047	FRANKLIN	77													C47
049	FULTON	71					*			1					C49
		77													
051	GIBSON	77	3							*					C51
053	GRANT	77													C53
055	GREENE	71	2				I			*					C55
		77													
057	HAMILTON	71													057
		77													
059	HANCOCK	71													C59
		77													
061	HARRISON	19								*					C61
		71													
		77													
063	HENDRICKS	71								1					C63
		77													
065	HENRY	77													C65
067	HOWARD	71													C67
		77													
069	HUNTINGTON	77													C69
071	JACKSON	71					*			1					C71
		77													
073	JASPER	71					*			1					C73
		77													
075	JAY	77													C75
077	JEFFERSON	19								1					C77
		77													
079	JENNINGS	71								1					C79
		77													
081	JOHNSON	71								1					C81
		77													
083	KNOX	77	3							*					083
085	KOSCIUSKO	11					*			1					C85
		71													
		77													
087	LAGRANGE	11					*			*					C87
		71													
		77													
089	LAKE	11					*			1					C89
		71													
		73													
		77													
091	LA PORTE	11					*			1					091
		71													
		73													
		77													
093	LAWRENCE	71					*			*					C93
		77													
095	MADISON	77													C95
097	MARION	71								1					C97
		77													
099	MARSHALL	71					*			1					C99
		77													
101	MARTIN	71	2				I			*					101
		77													
103	MIAMI	71													103

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=18 STATE=INDIANA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
		77													
105	MONROE	71					*			*					105
		77													
107	MONTGOMERY	71								*					107
		77													
109	MORGAN	71					*			*					109
		77													
111	NEWTON	71					*			1					111
		77													
113	NOBLE	11					*			1					113
		71													
		77													
115	OHIO	77													115
117	ORANGE	71								*					117
		77													
119	OWEN	71	2							*					119
		77													
121	PARKE	77	2				*								121
123	PERRY	19	2				*			*					123
		71													
		77													
125	PIKE	77	2							*					125
127	PORTER	11					*			1					127
		71													
		73													
		77													
129	POSEY	19	2							*					129
		77													
131	PULASKI	71					*			1					131
		77													
133	PUTNAM	71								*					133
		77													
135	RANDOLPH	77													135
137	RIPLEY	77													137
139	RUSH	77													139
141	ST JOSEPH	11					*			1					141
		71													
		77													
143	SCOTT	71					I			1					143
		77													
145	SHELBY	71													145
		77													
147	SPENCER	19	2				*			*					147
		71													
		77													
149	STARKE	71					*			1					149
		77													
151	STEUBEN	11					*			*					151
		71													
		77													
153	SULLIVAN	77	3							*					153
155	SWITZERLAND	19													155
		77													
157	TIPPECANOE	71								1					157
		77													
159	TIPTON	71													159
		77													
161	UNION	77													161
163	VANDERBURGH	19	2							*					163
		77													
165	VERMILLION	77	2				I			*					165
167	VIGO	77	3							*					167
169	WABASH	71													169
		77													
171	WARREN	71	*							1					171
		77													
173	WARRICK	19	2							*					173
		77													
175	WASHINGTON	71					*			*					175
		77													
177	WAYNE	77													177
179	WELLS	77													179
181	WHITE	71					*			1					181
		77													
183	WHITLEY	71													183
		77													

FIPS STATE NUMBER=19 STATE=IOWA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	ADAIR	6													001
003	ADAMS	6													003
005	ALLAMAKEE	19					I								005
		27													
		66													
		72													
		77													
007	APPANOOSE		2												007
009	AUDUBON	6													009
011	BENTON														011

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=19 STATE=IOWA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
013	BLACK HAWK														C13
015	BOONE		2												C15
017	BREMER														C17
019	BUCHANAN														C19
021	BUENA VISTA	6													C21
023	BUTLER	6													C23
025	CALHOUN	6													C25
027	CARROLL	6													C27
029	CASS	6	1												C29
031	CEDAR														C31
033	CERRO GORDO	6													C33
035	CHEROKEE	6													C35
037	CHICKASAW														C37
039	CLARKE														C39
041	CLAY	6													C41
043	CLAYTON	19													C43
		27													
		66													
		72													
		77													
045	CLINTON	19													C45
		27													
		66													
		72													
		77													
047	CRAWFORD	6													C47
049	DALLAS	6	2												C49
051	DAVIS		2												C51
053	DECATUR		2												C53
055	DELAWARE														C55
057	DES MOINES	19													C57
		27													
		66													
		72													
		77													
059	DICKINSON	6													C59
061	DUBUQUE	19													C61
		27													
		66													
		72													
		77													
063	EMMET	6													C63
065	FAYETTE														C65
067	FLOYD	6													C67
069	FRANKLIN	6													C69
071	FREMONT	6													C71
073	GREENE	6	2												C73
075	GRUNDY														C75
077	GUTHRIE	6	1												C77
079	HAMILTON	6	1												C79
081	HANCOCK	6													C81
083	HARDIN	6	1												C83
085	HARRISON	6													C85
087	HENRY		1												C87
089	HOWARD														C89
091	HUMBOLDT	6													C91
093	IDA	6													C93
095	IOWA														C95
097	JACKSON	19													C97
		27													
		66													
		72													
		77													
099	JASPER		2												C99
101	JEFFERSON		2												101
103	JOHNSON														103
105	JONES														105
107	KEOKUK		2												107
109	KOSSUTH	6													109
111	LEE	19	1												111
		27													
		66													
		72													
		77													
113	LINN														113
115	LOUISA	19													115
		27													
		66													
		72													
		77													
117	LUCAS		2												117
119	LYON	6													119
121	MADISON	6													121
123	MAHASKA		2												123
125	MARION		2												125
127	MARSHALL		1												127
129	MILLS	6													129
131	MITCHELL	6													131
133	MONONA	6													133
135	MONROE		2												135
137	MONTGOMERY	6													137
139	MUSCATINE	19													139

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=19 STATE=IOWA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		27													
		66													
		72													
		77													
141	O BRIEN	6													141
143	OSCEOLA	6													143
145	PAGE	.													145
147	PALO ALTO	6													147
149	PLYMOUTH	6													149
151	POCAHONTAS	6													151
153	POLK		2												153
155	POTTAWATTAMIE	6													155
157	POWESHIEK														157
159	RINGGOLD	6													159
161	SAC	6													161
163	SCOTT	19	1												163
		27													
		66													
		72													
		77													
165	SHELBY	6													165
167	SIOUX	6													167
169	STORY		2												169
171	TAMA														171
173	TAYLOR	6													173
175	UNION	6													175
177	VAN BUREN		2												177
179	WAPELLO		2												179
181	WARREN		2												181
183	WASHINGTON														183
185	WAYNE														185
187	WEBSTER	6	2												187
189	WINNEBAGO	6													189
191	WINNESHIEK														191
193	WOODBURY	6													193
195	WORTH	6													195
197	WRIGHT	6													197

FIPS STATE NUMBER=20 STATE=KANSAS

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ALLEN														C01
003	ANDERSON	6													C03
005	ATCHISON	6	1												005
007	BARBER														C07
009	BARTON	6													C09
011	BOURBON		2												C11
013	BROWN	6	2												C13
015	BUTLER	6													C15
017	CHASE	6													C17
019	CHAUTAUQUA	6													C19
021	CHEROKEE		2												C21
023	CHEYENNE														C23
025	CLARK	59													C25
027	CLAY	6													C27
029	CLOUD	6													C29
031	COFFEY	6													C31
033	COMANCHE														C33
035	COWLEY	6	1												C35
037	CRAWFORD		2												C37
039	DECATUR														C39
041	DICKINSON	6													C41
043	DONIPHAN	6													C43
045	DOUGLAS	6													C45
047	EDWARDS														C47
049	ELK	6													C49
051	ELLIS	6													C51
053	ELLSWORTH	6													C53
055	FINNEY	59													055
057	FORD	59													C57
059	FRANKLIN	6	1												C59
061	GEARY	6													C61
063	GOVE	59													C63
065	GRAHAM														C65
067	GRANT	59													C67
069	GRAY	59													C69
071	GREELEY	59													C71
073	GREENWOOD	6													C73
075	HAMILTON	59													C75
077	HARPER														C77
079	HARVEY	6													C79
081	HASKELL	59													C81
083	HODGEMAN	59													C83
085	JACKSON	6													C85
087	JEFFERSON	6													C87
089	JEWELL	6													C89
091	JOHNSON	6													C91
093	KEARNY	59													C93
095	KINGMAN														C95
097	KIOWA														C97

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=20 STATE=KANSAS

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
099	LABETTE														C99
101	LANE	59													101
103	LEAVENWORTH	6	2												103
105	LINCOLN	6													105
107	LINN		2												107
109	LOGAN	59													109
111	LYON	6													111
113	MCPHERSON	6													113
115	MARION	6													115
117	MARSHALL	6													117
119	MEADE	59													119
121	MIAMI	6													121
123	MITCHELL	6													123
125	MONTGOMERY														125
127	MORRIS	6													127
129	MORTON	59													129
131	NEMAHA	6	1												131
133	NEOSHO														133
135	NESS	59													135
137	NORTON	6													137
139	OSAGE	6	2												139
141	OSBORNE	6													141
143	OTTAWA	6													143
145	PAWNEE														145
147	PHILLIPS	6													147
149	POTTAWATOMIE	6													149
151	PRATT														151
153	PAWLINS														153
155	RENO	6													155
157	REPUBLIC	6													157
159	RICE	6													159
161	RILEY	6													161
163	ROOKS	6													163
165	RUSH														165
167	RUSSELL	6													167
169	SALINE	6													169
171	SCOTT	59													171
173	SEDGWICK	6													173
175	SEWARD	59													175
177	SHAWNEE	6													177
179	SHERIDAN	59													179
181	SHERMAN	59													181
183	SMITH	6													183
185	STAFFORD														185
187	STANTON	59													187
189	STEVENS	59													189
191	SUMNER	6													191
193	THOMAS	59													193
195	TREGO	59													195
197	WABAUNSEE	6													197
199	WALLACE	59													199
201	WASHINGTON	6													201
203	WICHITA	59													203
205	WILSON														205
207	WOODSON	6													207
209	WYANDOTTE														209

FIPS STATE NUMBER=21 STATE=KENTUCKY

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ADAIR	66								1					C01
003	ALLEN	66								1					003
005	ANDERSON	66													C05
007	BALLARD	5													007
		19													
		77													
009	BARREN	66								1					C09
011	BATH	66					X			1					011
		65													
013	BELL	66	2							1					C13
		65													
015	BOONE	19													C15
		77													
017	BOURBON	66													C17
019	BOYD	77	2												C19
021	BOYLE	66								1					C21
023	BRACKEN	19													C23
		77													
025	BREATHITT	66	2												C25
		65													
027	BRECKINRIDGE	19													C27
		66													
		71													
		77													
029	BULLITT	66								1					C29
		71													
		77													
031	BUTLER	66	2												C31
033	CALDWELL	66	*												C33
035	CALLOWAY	5													C35

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=21 STATE=KENTUCKY

FIPS_CO	COUNTY	INP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		88													
037	CAMPBELL	19													C37
		77													
039	CARLISLE	5													C39
041	CARROLL	19													C41
		77													
043	CARTER	65	2				I								C43
045	CASEY	88								1					C45
047	CHRISTIAN	88	2												C47
049	CLARK	88								1					C49
		65													
051	CLAY	88	2												C51
		65													
053	CLINTON	88	1							1					C53
055	CRITTENDEN	19	2												C55
		77													
057	CUMBERLAND	88								1					C57
059	DAVIESS	19	2												C59
		88													
		77													
061	EDMONSON	88	2							2					C61
063	ELLIOTT	88	2												C63
		65													
065	ESTILL	88	*							1					C65
		65													
067	FAYETTE	88													C67
069	FLEMING	88								1					C69
		65													
071	FLOYD	88	3												C71
		65													
073	FRANKLIN	88													C73
075	FULTON	5													C75
077	GALLATIN	19													C77
		77													
079	GARRARD	88								1					C79
081	GRANT														C81
083	GRAVES	5													C83
		88													
085	GRAYSON	88	2												C85
087	GREEN	88													C87
089	GREENUP	65	2				I								C89
		77													
091	HANCOCK	19	2												091
		88													
		71													
		77													
093	HARDIN	19													C93
		88													
		71													
		77													
095	HARLAN	65	3							1					C95
097	HARRISON	88													C97
099	HART	88	*												C99
101	HENDERSON	19	3												101
		77													
103	HENRY														103
105	HICKMAN	5													105
107	HOPKINS	88	3												107
109	JACKSON	88	2												109
		65													
111	JEFFERSON	19								1					111
		71													
113	JESSAMINE	88													113
115	JOHNSON	88	2												115
		65													
117	KENTON	19													117
		77													
119	KNOTT	88	3												119
		65													
121	KNOX	88	2												121
		65													
123	LARUE	88													123
125	LAUREL	88	2												125
		65													
127	LAWRENCE	65	2												127
129	LEE	88	2												129
		65													
131	LESLIE	88	2												131
		65													
133	LETCHER	65	2							1					133
135	LEWIS	19	*							1					135
		65													
		77													
137	LINCOLN	88								1					137
139	LIVINGSTON	19											I		139
		77													
141	LOGAN	88	*							2					141
143	LYON	88					I								143
145	MCCRACKEN	5													145
		19													
		77													
147	MCCREARY	88	2												147

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=21 STATE=KENTUCKY

FIPS_CC	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		65													
149	MCLEAN	66	2												149
151	MADISON	66								1					151
		65													
153	MAGOFFIN	66	2												153
		65													
155	MARION	66								1					155
157	MARSHALL	66													157
159	MARTIN	65	2												159
161	MASON	19													161
		65													
		77													
163	MEADE	19													163
		71													
		77													
165	MENIFEE	66	1							1					165
		65													
167	MERCER	66													167
169	METCALFE	66													169
171	MONROE	66								1					171
173	MONTGOMERY	66								1					173
		65													
175	MORGAN	66	2												175
		65													
177	MUHLENBERG	66	3												177
179	NELSON	66								1					179
181	NICHOLAS	66													181
		65													
183	OHIO	66	2												183
185	OLDHAM	19								1					185
		77													
187	OWEN	66					I								187
189	OWSLEY	66	1												189
		65													
191	PENDLETON	19													191
		77													
193	PERRY	66	3							1					193
		65													
195	PIKE	65	3							1					195
197	POWELL	66	1							1					197
		65													
199	PULASKI	66	2							1					199
		65													
201	ROBERTSON	66													201
		65													
203	ROCKCASTLE	66	2							1					203
		65													
205	ROWAN	66	*							1					205
		65													
207	RUSSELL	66								1					207
209	SCOTT	66													209
211	SHELBY	66													211
213	SIMPSON	66													213
215	SPENCER	66													215
217	TAYLOR	66								1					217
219	TODD	66	*												219
221	TRIGG	66					I								221
223	TRIMBLE	19													223
		77													
225	UNION	19	3												225
		77													
227	WARREN	66	1												227
229	WASHINGTON	66													229
231	WAYNE	66	2												231
		65													
233	WEBSTER		1												233
235	WHITLEY	66	2							1					235
		65													
237	WOLFE	66	2												237
		65													
239	WOODFORD	66													239

FIPS STATE NUMBER=22 STATE=LOUISIANA

FIPS_CC	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ACADIA	69									2				C01
003	ALLEN	69													C03
005	ASCENSION	5									2				C05
		7													
		69													
007	ASSUMPTION	5									2				C07
		7													
		69													
009	AVOYELLES	5													C09
		69													
011	BEAUREGARD	69													C11
013	BIENVILLE	5	*												C13
015	BOSSIER		*				I								C15
017	CADDO		*												C17
019	CALCASIEU	7									2				C19

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=22 STATE=LOUISIANA

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		89													
021	CALDWELL	5	*												C21
023	CAMERON	7									1				C23
		26													
		89													
025	CATAHOULA	5													C25
027	CLAIBORNE	5	*				I								C27
029	CONCORDIA	5													C29
		89													
031	DE SOTO		*												C31
033	EAST BATON ROUGE	5													C33
		89													
035	EAST CARROLL	5													C35
		89													
037	EAST FELICIANA	5													C37
039	EVANGELINE	5													C39
		89													
041	FRANKLIN	5													C41
043	GRANT	5	*												C43
045	IBERIA	5									1				C45
		7													
		26													
		89													
047	IBERVILLE	5									2				C47
		7													
		89													
049	JACKSON	5	*												C49
051	JEFFERSON	7									1				C51
		26													
		89													
053	JEFFERSON DAVIS	7									1				C53
		89													
055	LAFAYETTE	7									1				C55
		89													
057	LAFOURCHE	7									1				C57
		26													
		89													
059	LA SALLE	5													C59
061	LINCOLN	5	*				I								C61
063	LIVINGSTON	5									2				C63
		89													
065	MADISON	5													C65
		89													
067	NORMOUSE	5													C67
069	NATCHITOCHES		*												C69
071	ORLEANS	7									1				C71
		89													
073	OUACHITA	5	*												C73
075	PLAQUEMINES	7									1				C75
		26													
		89													
077	POINTE COUPEE	5									2				C77
		89													
079	RAPIDES	5													C79
		89													
081	RED RIVER		*												C81
083	RICHLAND	5	*												C83
085	SABINE	89	*												085
087	ST BERNARD	7									2				C87
		26													
		89													
089	ST CHARLES	7									1				C89
		89													
091	ST HELENA	5													C91
093	ST JAMES	5									1				C93
		7													
		89													
095	ST JOHN THE BAPTIST	5									1				C95
		7													
		89													
097	ST LANDRY	5													C97
		89													
099	ST MARTIN	5									2				C99
		7													
		89													
101	ST MARY	5									2				101
		7													
		26													
		89													
103	ST TAMMANY	5									2				103
		89													
105	TANGIPAHOA	5									2				105
		89													
107	TENSAS	5													107
		89													
109	TERREBONNE	7									1				109
		26													
		89													
111	UNION	5	*												111
113	VERMILION	7									1				113
		26													
		89													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=22 STATE=LOUISIANA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
115	VERNON	69													115
117	WASHINGTON	5													117
		69													
119	WEBSTER		*				X								119
121	WEST BATON ROUGE	5													121
		69													
123	WEST CARROLL	5	*												123
125	WEST FELICIANA	5													125
		69													
127	WINN	5	*												127

FIPS STATE NUMBER=23 STATE=MAINE

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ANDROSCOGGIN	19													C01
		36													
		76													
003	AROOSTOOK	26					X	X			2				C03
		36													
		76													
005	CUMBERLAND	36													C05
		76													
007	FRANKLIN	36													C07
		76													
009	HANCOCK	19		X				X			2		X		C09
		26													
		36													
		68													
		76													
011	KENNEBEC	19													C11
		26													
		36													
		76													
013	KNOX	19							X						C13
		26													
		36													
		76													
015	LINCOLN	19													C15
		26													
		36													
		76													
017	OXFORD	36													C17
		76													
019	PENOBSCOT	19									2				C19
		26													
		36													
		76													
021	PISCATAQUIS	19					X		X		2				C21
		26													
		36													
		76													
023	SAGADAHOC	19													C23
		26													
		36													
		76													
025	SOMERSET	19		X				X	X						C25
		26													
		36													
		76													
027	WALDO	19													C27
		26													
		36													
		76													
029	WASHINGTON	19						X			2				C29
		26													
		36													
		68													
		76													
031	YORK	26													C31
		36													
		76													

FIPS STATE NUMBER=24 STATE=MARYLAND

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ALLEGANY	51	2				X								C01
		76													
003	ANNE ARUNDEL	14					X								C03
		19													
		27													
		51													
		76													
005	BALTIMORE	14		X											005
		19													
		27													
		51													
		76													
009	CALVERT	14													C09

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=24 STATE=MARYLAND

FIPS_CC	COUNTY	IPP	COAL	CU	G_T	AU	PZ	RO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		19													
		27													
		51													
		76													
011	CAROLINE	19													
		51													C11
013	CARROLL	18		X			X								
		19													C13
		51													
		76													
015	CECIL	18													
		19													C15
		27													
		51													
		76													
017	CHARLES	18													
		19													C17
		27													
		51													
		76													
019	DORCHESTER	18													
		19													C19
		27													
		51													
021	FREDERICK	18		X			X								
		19													C21
		51													
		76													
023	GARRETT	51	2		1										
		76													C23
025	HARFORD	18					X								
		19													C25
		27													
		51													
		76													
027	HOWARD	18													
		19													C27
		51													
		76													
029	KENT	18													
		19													C29
		27													
		51													
031	MONTGOMERY	18													
		19													C31
		51													
		76													
033	PRINCE GEORGES	18													
		19													C33
		51													
		76													
035	QUEEN ANNES	18													
		19													C35
		27													
		51													
037	ST MARYS	18													
		19													C37
		27													
		51													
039	SOMERSET	18													
		19													C39
		27													
		51													
041	TALBOT	18													
		19													C41
		27													
		51													
043	WASHINGTON	51													
		76													C43
045	WICOMICO	18													
		19													C45
		27													
		51													
047	WORCESTER	19													
		28													C47
		51													

FIPS STATE NUMBER=25 STATE=MASSACHUSETTS

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	PZ	RO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	BARNSTABLE	36													C01
003	BERKSHIRE	22					X								C03
		36													
005	BRISTOL	36													C05
007	DUKES	36													C07
009	ESSEX	26													C09
		36													
011	FRANKLIN	22		X											C11
		26													
		36													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=25 STATE=MASSACHUSETTS

FIPS_CO	COUNTY	IPP	COAL	CO	G_T	AU	PE	MO	NI	O_S	PERT	P	AG	U	FIPS_CC
013	HAMPDEN	22													013
		26													
		36													
015	HAMPSHIRE	22													015
		26													
		36													
017	MIDDLESEX	26													C17
		36													
019	NANTUCKET	36													C19
021	NORFOLK	36													C21
023	PLYMOUTH	36													C23
025	SUFFOLK	36													C25
027	WORCESTER	36													C27

FIPS STATE NUMBER=26 STATE=MICHIGAN

FIPS_CO	COUNTY	IPP	COAL	CO	G_T	AU	PE	MO	NI	O_S	PERT	P	AG	U	FIPS_CC
001	ALCONA	11								1	2				C01
		23													
		61													
		71													
		73													
003	ALGER	11									2				C03
		19													
		71													
		73													
005	ALLEGAN	11													C05
		36													
		71													
		73													
		77													
007	ALPENA	11								1	2				007
		23													
		71													
		73													
009	ANTRIM	11								1	2				C09
		73													
011	ARENAC	11									2				C11
		36													
		61													
		71													
		73													
013	BARAGA	11					X				2				C13
		19													
		73													
015	BARRY	11													C15
		36													
		71													
		77													
017	BAY	11	2								2				C17
		36													
		61													
		71													
		73													
		77													
019	BENZIE	11								1	2				C19
		71													
		73													
021	BERRIEN	11								1					C21
		36													
		71													
		73													
		77													
023	BRANCH	11													C23
		36													
		71													
		77													
025	CALHOUN	11													C25
		36													
		71													
		77													
027	CASS	11													C27
		36													
		71													
		77													
029	CHARLEVOIX	11								1	2				C29
		73													
031	CHEBOYGAN	11								1	2				C31
		71													
		73													
033	CHIPPEWA	11									1				C33
		19													
		71													
		73													
035	CLARE	11									2				C35
		71													
		77													
037	CLINTON	11													C37
		36													
		71													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=26 STATE=MICHIGAN

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	Z	FIPS_CC
		77													
039	CRAWFORD	11									1				C39
		23													
		71													
041	DELTA	11									1				C41
		19													
		71													
		73													
043	DICKINSON	11					X				2				C43
		19													
		71													
045	EATON	11													C45
		30													
		71													
		77													
047	EMMET	11								1	2				C47
		71													
		73													
049	GENESEE	11	1												C49
		30													
		77													
051	GLADWIN	11									2				C51
		71													
		77													
053	GOGEBIC	11		X			X				2				C53
		19													
		73													
055	GRAND TRAVERSE	11								1	2				C55
		71													
		73													
057	GRATIOT	11													C57
		30													
		71													
		77													
059	HILLSDALE	11													C59
		30													
		71													
		77													
061	HOUGHTON	11		X							2		X		C61
		19													
		73													
063	HURON	11	1												C63
		30													
		61													
		73													
		77													
065	INGHAM	11													C65
		30													
		71													
		77													
067	IONIA	11													C67
		30													
		71													
		77													
069	IOSCO	11									2				C69
		23													
		30													
		61													
		71													
		73													
071	IRON	11					X				1				C71
		19													
		71													
073	ISABELLA	11									2				C73
		71													
		77													
075	JACKSON	11													C75
		30													
		71													
		77													
077	KALAMAZOO	11													C77
		30													
		71													
		77													
079	KALKASKA	11								1	1				C79
		71													
		73													
081	KENT	11													C81
		30													
		71													
		77													
083	KEWEENAW	11		X							2				C83
		19													
		73													
085	LAKE	11									2				C85
		71													
		77													
087	LAPEER	11													C87
		30													
		77													
089	LEELANAU	11									2				C89
		73													

APPENDIX C (CONTINUED)

---------- FIPS STATE NUMBER=26 STATE=MICHIGAN ----------

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
091	LENAWEE	11								1					C91
		38													
		71													
		77													
093	LIVINGSTON	11													C93
		38													
		71													
		77													
095	LUCE	11									1				C95
		19													
		71													
		73													
097	MACKINAC	11									1				C97
		19													
		71													
		73													
099	MACOMB	11								1					C99
		38													
		61													
		73													
		77													
101	MANISTEE	11								1	2				101
		71													
		73													
103	MARQUETTE	11				X	X				2				103
		19													
		71													
		73													
105	MASON	11								1	2				105
		73													
		77													
107	MENOMINEE	11													107
		71													
		77													
109	MONROE	11									2				109
		19													
		71													
		73													
111	MIDLAND	11									2				111
		38													
		71													
		77													
113	MISSAUKEE	11									1				113
		23													
		71													
115	MONROE	11								1					115
		38													
		61													
		73													
		77													
117	MONTCALM	11													117
		38													
		71													
		77													
119	MONTMORENCY	11								1	2				119
		23													
		71													
121	MUSKEGON	11													121
		73													
		77													
123	NEWAYGO	11													123
		71													
		77													
125	OAKLAND	11													125
		38													
		77													
127	OCEANA	11													127
		73													
		77													
129	OGEMAW	11									2				129
		23													
		71													
131	ONTONAGON	11		X							2		X		131
		19													
		73													
133	OSCEOLA	11									2				133
		71													
		77													
135	OSCODA	11									2				135
		23													
		71													
137	OTSEGO	11								1	2				137
		23													
		71													
139	OTTAWA	11													139
		38													
		73													
		77													
141	PRESQUE ISLE	11									2				141
		23													
		71													
		73													

FIPS STATE NUMBER=26 STATE=MICHIGAN

FIPS_CO	COUNTY	INP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
143	ROSCOMMON	11									1				143
		23													
		71													
145	SAGINAW	11	2												145
		38													
		71													
		77													
147	ST CLAIR	11								1					147
		38													
		61													
		73													
		77													
149	ST JOSEPH	11													149
		38													
		71													
		77													
151	SANILAC	11								1					151
		38													
		61													
		73													
		77													
153	SCHOOLCRAFT	11									1				153
		19													
		71													
		73													
155	SHIAWASSEE	11	1												155
		38													
		71													
		77													
157	TUSCOLA	11	2												157
		38													
		61													
		73													
		77													
159	VAN BUREN	11													159
		38													
		71													
		73													
		77													
161	WASHTENAW	11								1					161
		38													
		71													
		77													
163	WAYNE	11								1					163
		38													
		61													
		73													
		77													
165	WEXFORD	11									2				165
		71													

FIPS STATE NUMBER=27 STATE=MINNESOTA

FIPS_CO	COUNTY	INP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	AITKIN	11									1				001
		19													
		38													
		71													
		77													
003	ANOKA	38									2				003
		71													
		77													
005	BECKER	6									2				005
		19													
		71													
		77													
007	BELTRAMI	6									1				007
		19													
		38													
		71													
		77													
009	BENTON	6									2				009
		71													
		77													
011	BIG STONE	6													011
013	BLUE EARTH	77									2				013
015	BROWN	6									2				015
017	CARLTON	11									1				017
		19													
		38													
		77													
019	CARVER	66									2				019
		77													
021	CASS	6									1				021
		19													
		38													
		71													
		77													
023	CHIPPEWA	6													023
025	CHISAGO	19									2				025

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=27 STATE=MINNESOTA

FIPS_CO	COUNTY	IND	COEL	CO	O_T	AR	FE	MO	NI	O_S	PRAT	P	AM	W	FIPS_CC
		36													
		71													
		77													
027	CLAY	6													C27
		71													
029	CLEARWATER	6									1				C29
		19													
		36													
		71													
		77													
031	COOK	11					I				2				C31
		19													
		73													
033	COTTONWOOD	6													C33
035	CROW WING	6					I				1				C35
		19													
		36													
		71													
		77													
037	DAKOTA	19									2				C37
		66													
		72													
		77													
039	DODGE	77													C39
041	DOUGLAS	6									2				C41
		77													
043	FARIBAULT										2				C43
045	FILLMORE	77					I								C45
047	FREEBORN	77									2				C47
049	GOODHUE	19													C49
		66													
		72													
		77													
051	GRANT	6													C51
053	HENNEPIN	66									2				C53
		77													
055	HOUSTON	19													C55
		27													
		66													
		72													
		77													
057	HUBBARD	6									2				C57
		19													
		36													
		71													
		77													
059	ISANTI	36									2				C59
		71													
		77													
061	ITASCA	11					I				1				C61
		19													
		36													
		71													
		77													
063	JACKSON	6													C63
065	KANABEC	19									2				C65
		36													
		71													
		77													
067	KANDIYOHI	6									2				C67
069	KITTSON	6									1				C69
		36													
		71													
071	KOOCHICHING	19									1				C71
		36													
		71													
073	LAC QUI PARLE	6													C73
075	LAKE	11			I		I	I		I	2		I		C75
		19													
		73													
077	LAKE OF THE WOODS	19									1				C77
		36													
		71													
079	LE SUEUR	77									2				C79
081	LINCOLN	6													C81
083	LYON	6													C83
085	MCLEOD	6									2				C85
		77													
087	MAHNOMEN	6									2				C87
		19													
		71													
		77													
089	MARSHALL	6									1				C89
		19													
		36													
		71													
091	MARTIN	6													C91
093	MEEKER	6									2				C93
095	MILLE LACS	19									2				C95
		36													
		71													
		77													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=27 STATE=MINNESOTA

FIPS_CC	COUNTY	IBP	COAL	CU	G_T	AU	PE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
097	MORRISON	6									2				097
		71													
		77													
099	MOWER	77													099
101	MURRAY	6													101
103	NICOLLET	6									2				103
105	NOBLES	6													105
107	NORMAN	6													107
		71													
109	OLMSTED	77													109
111	OTTER TAIL	6									2				111
		71													
		77													
113	PENNINGTON	6									1				113
		19													
		34													
		71													
115	PINE	11									2				115
		19													
		34													
		71													
		77													
117	PIPESTONE	6													117
119	POLK	6									1				119
		19													
		34													
		71													
		77													
121	POPE	6									2				121
123	RAMSEY	66									2				123
		72													
		77													
125	RED LAKE	6									1				125
		19													
		34													
		71													
127	REDWOOD	6													127
129	RENVILLE	6													129
131	RICE	77									2				131
133	ROCK	6													133
135	ROSEAU	6									1				135
		19													
		34													
		71													
137	ST LOUIS	11		X			X		X		1				137
		19													
		34													
		73													
		77													
139	SCOTT	66									2				139
		77													
141	SHERBURNE	71									2				141
		77													
143	SIBLEY	6									2				143
		77													
145	STEARNS	6									2				145
		77													
147	STEELE	77									2				147
149	STEVENS	6													149
151	SWIFT	6													151
153	TODD	6									2				153
		71													
		77													
155	TRAVERSE	6													155
157	WABASHA	19													157
		27													
		66													
		72													
		77													
159	WADENA	6									2				159
		19													
		71													
		77													
161	WASECA	77									2				161
163	WASHINGTON	19									2				163
		34													
		66													
		72													
		77													
165	WATONWAN	6													165
167	WILKIN	6													167
169	WINONA	19													169
		27													
		66													
		72													
		77													
171	WRIGHT	6									2				171
		77													
173	YELLOW MEDICINE	6													173

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=28 STATE=MISSISSIPPI

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ADAMS	5													001
		49													
003	ALCORN	5													C03
		44													
005	AMITE	5													C05
007	ATTALA	5													C07
009	BENTON	5	*												C09
011	BOLIVAR	5													C11
		49													
013	CALHOUN	5													C13
015	CARROLL	5													015
017	CHICKASAW	5													017
019	CHOCTAW	5	*				I								C19
021	CLAIBORNE	5	*												C21
		49													
023	CLARKE	49													C23
025	CLAY														C25
027	COAHOMA	5													C27
029	COPIAH	5													C29
031	COVINGTON														C31
033	DE SOTO	5	*												C33
035	FORREST	49													C35
037	FRANKLIN	5													C37
039	GEORGE	49													C39
		50													
041	GREENE	49													041
043	GRENADA	3													043
045	HANCOCK	24													C45
		49													
		50													
047	HARRISON	24													C47
		49													
		50													
049	HINDS	5													C49
051	HOLMES	5	*												C51
053	HUMPHREYS.	5													C53
055	ISSAQUENA	5													C55
		49													
057	ITAWAMBA														C57
059	JACKSON	24													C59
		49													
		50													
061	JASPER		*												C61
063	JEFFERSON	5													C63
		49													
065	JEFFERSON DAVIS														C65
067	JONES	49													C67
069	KEMPER		*												C69
071	LAFAYETTE	5	*				I								C71
073	LAMAR														C73
075	LAUDERDALE	49	*												C75
077	LAWRENCE	49													C77
079	LEAKE	5													C79
081	LEE	5													C81
083	LEFLORE	5													C83
085	LINCOLN	5													C85
087	LOWNDES														C87
089	MADISON	5													C89
091	MARION	49													C91
093	MARSHALL	5													C93
095	MONROE														095
097	MONTGOMERY	5													C97
099	NESHOBA														C99
101	NEWTON	49													101
103	NOXUBEE														103
105	OKTIBBEHA														105
107	PANOLA	5													107
109	PEARL RIVER	49	*												109
		50													
111	PERRY	49													111
113	PIKE	5													113
115	POTOTOC	5													115
117	PRENTISS	5													117
119	QUITMAN	5													119
121	RANKIN		*												121
123	SCOTT	49	*												123
125	SHARKEY	5													125
127	SIMPSON														127
129	SMITH	49													129
131	STONE	49													131
		50													
133	SUNFLOWER	5													133
135	TALLAHATCHIE	5	*												135
137	TATE	5	*												137
139	TIPPAH	5	*												139
141	TISHOMINGO	44													141
143	TUNICA	5	*												143
145	UNION	5													145
147	WALTHALL														147
149	WARREN	5													149
		49													
151	WASHINGTON	5													151

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=28 STATE=MISSISSIPPI

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		89													
153	WAYNE	89													153
155	WEBSTER	5	*				1								155
157	WILKINSON	5													157
		89													
159	WINSTON		*												159
161	YALOBUSHA	5	*												161
163	YAZOO	5	*												163

FIPS STATE NUMBER=29 STATE=MISSOURI

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ADAIR		2												C01
003	ANDREW	6	*												C03
005	ATCHISON	6	*												C05
007	AUDRAIN		2												C07
009	BARRY														C09
011	BARTON		2												C11
013	BATES		2												C13
015	BENTON						I								C15
017	BOLLINGER						*								C17
019	BOONE		2												C19
021	BUCHANAN	6	*												C21
023	BUTLER	5					*								C23
025	CALDWELL		2												C25
027	CALLAWAY		2												C27
029	CAMDEN						I								C29
031	CAPE GIRARDEAU	19													C31
		66													
		72													
		77													
033	CARROLL		2												C33
035	CARTER						*								C35
037	CASS		2												C37
039	CEDAR		2												C39
041	CHARITON		2												C41
043	CHRISTIAN														C43
045	CLARK	19													C45
		27													
		66													
		72													
		77													
047	CLAY	6	2												C47
049	CLINTON	6	*												C49
051	COLE														C51
053	COOPER														C53
055	CRAWFORD			I			I						*		C55
057	DADE		2												C57
059	DALLAS														C59
061	DAVIESS	6	2												C61
063	DE KALB	6	*												C63
065	DENT						I						I		C65
067	DOUGLAS						*								C67
069	DUNKLIN	5													C69
071	FRANKLIN			*			I								C71
073	GASCONADE						*								C73
075	GENTRY	6	*												C75
077	GREENE						*								C77
079	GRUNDY		2												C79
081	HARRISON	6	2												C81
083	HENRY		2				*								C83
085	HICKORY														C85
087	HOLT	6	*												C87
089	HOWARD		2												C89
091	HOWELL						I								C91
093	IRON			I			I								C93
095	JACKSON														C95
097	JASPER		2												C97
099	JEFFERSON	19													C99
		66													
		72													
		77													
101	JOHNSON		2												101
103	KNOX														103
105	LACLEDE														105
107	LAFAYETTE		2												107
109	LAWRENCE														109
111	LEWIS	19													111
		27													
		66													
		72													
		77													
113	LINCOLN	19													113
		27													
		66													
		72													
		77													
115	LINN		2												115
117	LIVINGSTON		2												117
119	MCDONALD														119

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=29 STATE=MISSOURI

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	SO	UI	O_S	PEAT	P	AG	U	FIPS_CO
121	MACON		2												121
123	MADISON			I			*		I				I		123
125	MARIES														125
127	MARION	19													127
		27													
		66													
		72													
		77													
129	MERCER		2												129
131	MILLER						*								131
133	MISSISSIPPI	5													133
		19													
		66													
		72													
		77													
135	MONITEAU														135
137	MONROE		2												137
139	MONTGOMERY		2												139
141	MORGAN						*								141
143	NEW MADRID	5													143
145	NEWTON														145
147	NODAWAY	6	2												147
149	OREGON						I								149
151	OSAGE						I								151
153	OZARK						*								153
155	PEMISCOT	5													155
157	PERRY	19													157
		66													
		72													
		77													
159	PETTIS		2												159
161	PHELPS						I								161
163	PIKE	19													163
		27													
		66													
		72													
		77													
165	PLATTE	6	*												165
167	POLK						*								167
169	PULASKI						*								169
171	PUTNAM		2												171
173	RALLS	19	2												173
		27													
		66													
		72													
		77													
175	RANDOLPH		2												175
177	RAY		2												177
179	REYNOLDS			*			*						*		179
181	RIPLEY						*								181
183	ST CHARLES	19													183
		27													
		66													
		72													
		77													
185	ST CLAIR		2				*								185
187	ST FRANCOIS			*			I						I		187
189	ST LOUIS	19													189
		27													
		66													
		72													
		77													
193	STE GENEVIEVE	19		*			I						I		193
		66													
		72													
		77													
195	SALINE		2												195
197	SCHUYLER		2												197
199	SCOTLAND														199
201	SCOTT	5													201
		19													
		66													
		72													
		77													
203	SHANNON			*			*								203
205	SHELBY														205
207	STODDARD	5													207
209	STONE														209
211	SULLIVAN		2												211
213	TANEY														213
215	TEXAS						*								215
217	VERNON		2												217
219	WARREN														219
221	WASHINGTON			I			I						*		221
223	WAYNE						I								223
225	WEBSTER														225
227	WORTH	6	2												227
229	WRIGHT														229

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=30 STATE=MONTANA

FIPS_CO	COUNTY	IBP	COAL	CU	G_T	AU	PE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	BEAVERHEAD			X	3	X	X	X				X	X		C01
003	BIG HORN	25	3												C03
		63													
005	BLAINE	6	2												C05
007	BROADWATER		1	X		X	X	X					X		C07
009	CARBON	25	2											X	C09
		63													
011	CARTER	6												X	C11
		25													
		63													
013	CASCADE		2	X		X		X					X		C13
015	CHOUTEAU	6	1												C15
017	CUSTER	6	3												C17
		25													
		63													
019	DANIELS	6													C19
		25													
021	DAWSON	6	3												C21
		25													
		63													
023	DEER LODGE				2	X	X						X		C23
025	FALLON	6	2												C25
		25													
		63													
027	FERGUS		2			X							X		C27
029	FLATHEAD	69											X		C29
031	GALLATIN	63			3										C31
033	GARFIELD	6	2												C33
		25													
		63													
035	GLACIER		2				X								C35
037	GOLDEN VALLEY	63													C37
039	GRANITE			X		X							X		C39
041	HILL	6													C41
043	JEFFERSON			X	2	X							X		C43
045	JUDITH BASIN		2				X								C45
047	LAKE	69													C47
049	LEWIS AND CLARK	69		X	2	X							X		C49
051	LIBERTY	6													C51
053	LINCOLN	69		X		X							X		C53
055	MCCONE	6	3												C55
		25													
		63													
057	MADISON			X	2	X	X	X					X		C57
059	MEAGHER	63	1				X						X		C59
061	MINERAL	69				X							X		061
063	MISSOULA	69				X									C63
065	MUSSELSHELL	25	3												C65
		63													
067	PARK	63		X	3	X		X					X		C67
069	PETROLEUM	25													C69
071	PHILLIPS	6			3	X							X		C71
073	PONDERA														C73
075	POWDER RIVER	6	3												C75
		25													
		63													
077	POWELL	69				X		X					X		C77
079	PRAIRIE	6	2												C79
		25													
		63													
081	RAVALLI					X							X		C81
083	RICHLAND	6	2												C83
		25													
		63													
085	ROOSEVELT	6	2												C85
		25													
087	ROSEBUD	6	3												C87
		25													
		63													
089	SANDERS	69			3								X		C89
091	SHERIDAN	6	2												C91
		25													
093	SILVER BOW			X	2	X							X		C93
095	STILLWATER	63	1	X		X	X		X				X		C95
097	SWEET GRASS	63													C97
099	TETON						X								099
101	TOOLE	6													101
103	TREASURE	25	1												103
		63													
105	VALLEY	6													105
		25													
107	WHEATLAND														107
109	WIBAUX	6	2												109
		25													
		63													
111	YELLOWSTONE	25	2												111
		63													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=31 STATE=NEBRASKA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PERT	P	AG	U	FIPS_CC
001	ADAMS	6													C01
		12													
003	ANTELOPE	6													C03
		52													
005	ARTHUR	6													C05
		52													
007	BANNER	52													C07
009	BLAINE	6													C09
		52													
011	BOONE	6													C11
		52													
013	BOX BUTTE	6													C13
		12													
		52													
015	BOYD	6													C15
		12													
		52													
017	BROWN	6													C17
		12													
		52													
019	BUFFALO	6													C19
		12													
021	BURT	6													C21
023	BUTLER	6													C23
025	CASS	6													C25
027	CEDAR	6													027
029	CHASE														C29
031	CHERRY	6													C31
		12													
		52													
033	CHEYENNE														033
035	CLAY	6													C35
037	COLFAX	6													C37
039	CUMING	6													C39
041	CUSTER	6													041
		52													
043	DAKOTA	6													C43
045	DAWES	6													C45
		12													
		52													
047	DAWSON	6													C47
		12													
		52													
049	DEUEL														C49
051	DIXON	6													C51
053	DODGE	6													053
055	DOUGLAS	6													C55
057	DUNDY														C57
059	FILLMORE	6													C59
061	FRANKLIN	6													C61
		12													
063	FRONTIER	6													C63
		12													
065	FURNAS	6													C65
		12													
067	GAGE	6													C67
069	GARDEN	52													C69
071	GARFIELD	6													C71
		52													
073	GOSPER	6													C73
		12													
075	GRANT	6													C75
		52													
077	GREELEY	6													C77
		52													
079	HALL	6													C79
		12													
081	HAMILTON	6													C81
		12													
083	HARLAN	6													C83
		12													
085	HAYES														C85
087	HITCHCOCK														C87
089	HOLT	6													C89
		12													
		52													
091	HOOKER	6													C91
		52													
093	HOWARD	6													C9.
		12													
095	JEFFERSON	6													C95
097	JOHNSON	6													C97
099	KEARNEY	6													C99
		12													
101	KEITH	12													101
		52													
103	KEYA PAHA	6													103
		12													
		52													
105	KIMBALL	25													105
107	KNOX	6													107
		12													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=31 STATE=NEBRASKA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
109	LANCASTER	6													109
111	LINCOLN	6													111
		12													
		52													
113	LOGAN	6													113
		52													
115	LOUP	6													115
		52													
117	MCPHERSON	6													117
		52													
119	MADISON	6													119
121	MERRICK	6													121
		12													
123	MORRILL	52													123
125	NANCE	6													125
		12													
127	NEMAHA	6													127
129	NUCKOLLS	6													129
131	OTOE	6													131
133	PAWNEE	6													133
135	PERKINS	12													135
137	PHELPS	6													137
		12													
139	PIERCE	6													139
141	PLATTE	6													141
		12													
143	POLK	6													143
		12													
145	RED WILLOW	6													145
147	RICHARDSON	6													147
149	ROCK	6													149
		12													
		52													
151	SALINE	6													151
153	SARPY	6													153
155	SAUNDERS	6													155
157	SCOTTS BLUFF	52												X	157
159	SEWARD	6													159
161	SHERIDAN	6													161
		12													
		52													
163	SHERMAN	6													163
		12													
165	SIOUX	6												X	165
		12													
		52													
167	STANTON	6													167
169	THAYER	6													169
171	THOMAS	6													171
		52													
173	THURSTON	6													173
175	VALLEY	6													175
		52													
177	WASHINGTON	6													177
179	WAYNE	6													179
181	WEBSTER	6													181
183	WHEELER	6													183
185	YORK	6													185
		12													

FIPS STATE NUMBER=32 STATE=NEVADA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	CHURCHILL	53			1	X			X				X		C01
003	CLARK	13		X	3	X			X				X		C03
		28													
005	DOUGLAS				3		X							X	C05
007	ELKO			X	1	X		X					X	X	C07
009	ESMERALDA			X	3	X							X		C09
011	EUREKA			X	1	X	X		X				X		C11
013	HUMBOLDT				1	X	X	X					X	X	C13
015	LANDER			X	2	X	X						X	X	C15
017	LINCOLN	13		X		X	X						X		C17
019	LYON	53		X	2	X	X						X		C19
021	MINERAL			X	3	X							X		C21
023	NYE	13			2	X	X						X	X	C23
027	PERSHING			X	1	X	X	X					X		C27
029	STOREY	53			1	X	X						X		C29
		54													
031	WASHOE	53			1	X							X	X	C31
		54													
033	WHITE PINE	13		X	2	X							X		C33
510	CARSON CITY				3									3	510

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=33 STATE=NEW HAMPSHIRE

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	HU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	BELKNAP	36													C01
		76													
003	CARROLL	36													C03
		76													
005	CHESHIRE	26													C05
		36													
		76													
007	COOS	26		X		X							X		C07
		36													
		76													
009	GRAFTON	26													C09
		36													
		76													
011	HILLSBOROUGH	26													C11
		36													
		76													
013	MERRIMACK	26													C13
		36													
		76													
015	ROCKINGHAM	26													C15
		26													
		36													
		76													
017	STRAFFORD	36													C17
		76													
019	SULLIVAN	26													C19
		36													
		76													

FIPS STATE NUMBER=34 STATE=NEW JERSEY

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	HU	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	ATLANTIC	19			1										C01
		26													
		51													
		76													
003	BERGEN	22		X											C03
		51													
005	BURLINGTON	51			1										C05
		76													
007	CAMDEN	51													C07
		76													
009	CAPE MAY	19													C09
		26													
		51													
		76													
011	CUMBERLAND	19													C11
		51													
		76													
013	ESSEX	22													C13
		51													
015	GLOUCESTER	19													C15
		51													
		76													
017	HUDSON	51													C17
019	HUNTERDON	51													C19
		76													
021	MERCER	51													C21
		76													
023	MIDDLESEX	22													C23
		51													
025	MONMOUTH	22			1										C25
		26													
		51													
		76													
027	MORRIS	51					X								C27
		76													
029	OCEAN	22			1										C29
		26													
		51													
		76													
031	PASSAIC	51					X								C31
		76													
033	SALEM	19													C33
		51													
		76													
035	SOMERSET	51													C35
037	SUSSEX	51					X	X							C37
		76													
039	UNION	22													C39
		51													
041	WARREN	51		X			X								C41
		76													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=35 STATE=NEW MEXICO

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	BERNALILLO	57			*	X		X						X	001
003	CATRON	13			2	X		X					X	X	C03
		28													
005	CHAVES	57													C05
		67													
007	COLFAX	59	3			X		X							C07
009	CURRY	59													C09
		67													
011	DE BACA	57													C11
		67													
013	DONA ANA	57		X	2	X	X	X					X		C13
015	EDDY	57													C15
		60													
		67													
017	GRANT	13		X	3	X	X	X	X				X		C17
		28													
019	GUADALUPE	57		X						2					C19
		67													
021	HARDING	59													C21
023	HIDALGO	13		X	2	X		X					X		C23
		28													
025	LEA	67													C25
027	LINCOLN	67	1			X	X	X							C27
028	LOS ALAMOS	57													C28
029	LUNA				*			X					X		C29
031	MCKINLEY	13	2		3			X						X	C31
		25													
033	MORA														C33
035	OTERO	67		X	3	X	X	X							C35
037	QUAY	59													C37
		67													
039	RIO ARRIBA	13	1	X	3	X		X						X	C39
		28													
		57													
041	ROOSEVELT	59													C41
		67													
043	SANDOVAL	13	2		1	X							X	X	C43
		25													
		57													
045	SAN JUAN	13	3		3									X	045
		25													
		28													
047	SAN MIGUEL	57		X	*	X		X					X		C47
		59													
049	SANTA FE	57	2	X		X		X					X	X	C49
051	SIERRA	57		X	*	X	X	X					X		C51
053	SOCORRO	57	2	X	2	X	X	X					X	X	C53
		60													
055	TAOS	57			3			X							C55
057	TORRANCE	67													C57
059	UNION	59													C59
061	VALENCIA	13	1		*			X						X	C61
		57													

FIPS STATE NUMBER=36 STATE=NEW YORK

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	ALBANY	22													C01
		51													
		76													
003	ALLEGANY	11													003
		76													
005	BRONX	22													C05
		51													
007	BROOME	18			1										C07
		51													
		76													
009	CATTARAUGUS	11									2				C09
		76													
011	CAYUGA	11					X								C11
		76													
013	CHAUTAUQUA	11													C13
		76													
015	CHEMUNG	11			1										C15
		51													
		76													
017	CHENANGO	18													C17
		51													
		76													
019	CLINTON	11					X								C19
		76													
021	COLUMBIA	22													C21
		51													
		76													
023	CORTLAND	11													C23
		51													
		76													
025	DELAWARE	18													C25
		51													
		76													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=36 STATE=NEW YORK

FIPS_CO	COUNTY	INP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	NEPS_CO
027	DUTCHESS	22 51 76					X								C27
029	ERIE	11 76													C29
031	ESSEX	11 76					X								C31
033	FRANKLIN	11 76					X								C33
035	FULTON	51 76													C35
037	GENESEE	11 76													C37
039	GREENE	22 51 76													C39
041	HAMILTON	11 76													C41
043	HERKIMER	11 51 76													C43
045	JEFFERSON	11 76					X								C45
047	KINGS	22 24 51													C47
049	LEWIS	11 76													C49
051	LIVINGSTON	11 76													C51
053	MADISON	11 51 76													C53
055	MONROE	11 76													C55
057	MONTGOMERY	51 76													C57
059	NASSAU	22 24 36													C59
061	NEW YORK	22 51													C61
063	NIAGARA	11 76													C63
065	ONEIDA	11 76													C65
067	ONONDAGA	11 76													C67
069	ONTARIO	11 76													C69
071	ORANGE	22 51 76					X								C71
073	ORLEANS	11 76													C73
075	OSWEGO	11 76													C75
077	OTSEGO	14 51 76													C77
079	PUTNAM	22 51 76		X			X								C79
081	QUEENS	22 24 51													C81
083	RENSSELAER	22 51 76													C83
085	RICHMOND	22 51													C85
087	ROCKLAND	22 51 76													C87
089	ST LAWRENCE	11 76					X						X		C89
091	SARATOGA	51 76													C91
093	SCHENECTADY	51 76													C93
095	SCHOHARIE	51 76													C95
097	SCHUYLER	11 51 76			1										C97
099	SENECA	11 76													C99
101	STEUBEN	11 51 76			1										101
103	SUFFOLK	22 24													103

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=36 STATE=NEW YORK

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AD	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		36													
105	SULLIVAN	51		X											105
		76													
107	TIOGA	51			1										107
		51													
		76													
109	TOMPKINS	51			1										109
		51													
		76													
111	ULSTER	42													111
		51													
		76													
113	WARREN	51													113
		76													
115	WASHINGTON	22													115
		51													
		76													
117	WAYNE	51					X								117
		76													
119	WESTCHESTER	22		X			X								119
		51													
		76													
121	WYOMING	51													121
		76													
123	YATES	51													123
		76													

FIPS STATE NUMBER=37 STATE=NORTH CAROLINA

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AD	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ALAMANCE														C01
003	ALEXANDER														C03
005	ALLEGHANY														C05
007	ANSON														C07
009	ASHE			X			X						X		C09
011	AVERY						X								C11
013	BEAUFORT	29									1	X			C13
		32													
		38													
		69													
015	BERTIE	29									2				C15
		32													
		38													
		69													
017	BLADEN	69													C17
019	BRUNSWICK	26			1						2				C19
		29													
		32													
		38													
		69													
021	BUNCOMBE														C21
023	BURKE					X									C23
025	CABARRUS					X									C25
027	CALDWELL														C27
029	CAMDEN	19									1				C29
		29													
		32													
		38													
		69													
031	CARTERET	29									2				C31
		29													
		32													
		38													
		69													
033	CASWELL														C33
035	CATAWBA						X								C35
037	CHATHAM		X												C37
039	CHEROKEE	44					X								C39
041	CHOWAN	29									1				C41
		32													
		38													
		69													
043	CLAY						X								C43
045	CLEVELAND			X		X									C45
047	COLUMBUS	38			1						2				C47
		69													
049	CRAVEN	29			1						2				C49
		32													
		38													
		69													
051	CUMBERLAND	69													C51
053	CURRITUCK	19									1				C53
		26													
		29													
		32													
		38													
		69													
055	DARE	26									1				C55
		29													
		32													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=37 STATE=NORTH CAROLINA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	NO	NI	O_S	PEAT	P	SA	U	FIPS_CC
		38													
		49													
057	DAVIDSON					X							X		057
059	DAVIE														C59
061	DUPLIN				1						2				C61
063	DURHAM														C63
065	EDGECOMBE														C65
067	FORSYTH														C67
069	FRANKLIN					X									C69
071	GASTON					X									C71
073	GATES	29									1				C73
		32													
		38													
075	GRAHAM	46													C75
077	GRANVILLE						X								C77
079	GREENE				1										C79
081	GUILFORD			X		X									C81
083	HALIFAX							X							C83
085	HARNETT														C85
087	HAYWOOD	46													C87
089	HENDERSON														C89
091	HERTFORD	29									2				C91
		32													
		38													
		49													
093	HOKE														C93
095	HYDE	26									2				C95
		29													
		32													
		38													
		49													
097	IREDELL														C97
099	JACKSON			X					X						C99
101	JOHNSTON														101
103	JONES	29			1						2				103
		32													
		38													
		49													
105	LEE		2												105
107	LENOIR	49			1						2				107
109	LINCOLN						X								109
111	MCDOWELL														111
113	MACON														113
115	MADISON	46						X							115
117	MARTIN	29													117
		32													
		49													
119	MECKLENBURG					X									119
121	MITCHELL														121
123	MONTGOMERY					X									123
125	MOORE														125
127	NASH														127
129	NEW HANOVER	26									2				129
		29													
		32													
		38													
		49													
131	NORTHAMPTON														131
133	ONSLOW	26			1						2				133
		29													
		32													
		38													
		49													
135	ORANGE														135
137	PAMLICO	26									2				137
		29													
		32													
		38													
		49													
139	PASQUOTANK	29									1				139
		32													
		38													
		49													
141	PENDER	26									2				141
		29													
		32													
		38													
		49													
143	PERQUIMANS	29									1				143
		32													
		38													
		49													
145	PERSON			X											145
147	PITT	29			1										147
		32													
		38													
		49													
149	POLK														149
151	RANDOLPH					X									151
153	RICHMOND														153
155	ROBESON	49													155
157	ROCKINGHAM														157

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=37 STATE=NORTH CAROLINA

FIPS_CO	COUNTY	IRP	COAL	CN	G_T	AD	PE	NO	NI	O_S	PERT	P	AS	S	FIPS_CO
159	RUTHERFORD			X		X							X		159
161	SAMPSON														161
163	SCOTLAND														163
165	STANLY					X									165
167	STOKES														167
169	SURRY														169
171	SWAIN	44		X											171
173	TRANSYLVANIA					X									173
175	TYRRELL	29									1				175
		32													
		38													
		49													
177	UNION					X									177
179	VANCE														179
181	WAKE														181
183	WARREN														183
185	WASHINGTON	29									1				185
		32													
		38													
		49													
187	WATAUGA														187
189	WAYNE				1										189
191	WILKES														191
193	WILSON														193
195	YADKIN														195
197	YANCEY														197
199								X							199

FIPS STATE NUMBER=38 STATE=NORTH DAKOTA

FIPS_CO	COUNTY	IRP	COAL	CN	G_T	AD	PE	NO	NI	O_S	PERT	P	AS	S	FIPS_CO
001	ADAMS	6	2												001
		25													
003	BARNES	6													003
		70													
005	BENSON	6													005
007	BILLINGS	6	3					X						X	007
		25													
009	BOTTINEAU	6													009
011	BOWMAN	6	2											X	011
		25													
013	BURKE	6	2												013
		25													
015	BURLEIGH	6	2												015
		25													
017	CASS	6													017
019	CAVALIER	6													019
021	DICKEY	6													021
		70													
023	DIVIDE	6	2												023
		25													
025	DUNN	6	3												025
		25													
027	EDDY	6													027
		70													
029	EMMONS	6													029
031	FOSTER	6													031
		70													
033	GOLDEN VALLEY	6	2												033
		25													
		63													
035	GRAND FORKS	6													035
		71													
037	GRANT	6	2												037
		25													
039	GRIGGS	6													039
041	HETTINGER	6	2												041
		25													
043	KIDDER	6													043
		70													
045	LA MOURE	6													045
		70													
047	LOGAN	6													047
		70													
049	MCHENRY	6	2												049
		25													
051	MCINTOSH	6													051
		70													
053	MCKENZIE	6	2												053
		25													
		63													
055	MCLEAN	6	3												055
		25													
057	MERCER	6	3												057
		25													
059	MORTON	6	2												059
		25													
061	MOUNTRAIL	6	2												061
		25													
063	NELSON	6													063

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=38 STATE=NORTH DAKOTA

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AS	PZ	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
065	OLIVER	6	2												C65
		25													
C67	PEMBINA	6													C67
		71													
069	PIERCE	6													C69
071	RAMSEY	6													C71
073	RANSOM	6													C73
		70													
075	RENVILLE	6	1												C75
		25													
077	RICHLAND	6													C77
079	ROLETTE	6													C79
081	SARGENT	6													C81
		70													
083	SHERIDAN	6													C83
		25													
085	SIOUX	6													C85
		25													
087	SLOPE	6	3											X	C87
		25													
089	STARK	6	3												C89
		25													
091	STEELE	6													C91
093	STUTSMAN	6													C93
		70													
095	TOWNER	6													C95
097	TRAILL	6													C97
		71													
099	WALSH	6													C99
		71													
101	WARD	6	2												101
		25													
103	WELLS	6													103
		70													
105	WILLIAMS	6	3												105
		25													

FIPS STATE NUMBER=39 STATE=OHIO

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AS	PZ	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ADAMS	19								1					C01
		65													
		77													
003	ALLEN	11													C03
		77													
005	ASHLAND	11													C05
		77													
007	ASHTABULA	11								1					C07
		61													
		73													
		77													
009	ATHENS	77	3												C09
011	AUGLAIZE	11													C11
		77													
013	BELMONT	77	3												C13
015	BROWN	19													C15
		65													
		77													
017	BUTLER	77													C17
019	CARROLL	77	2												C19
021	CHAMPAIGN	77													C21
023	CLARK	77													023
025	CLERMONT	19													C25
		77													
027	CLINTON	77													C27
029	COLUMBIANA	77	3												C29
031	COSHOCTON	77	2												C31
033	CRAWFORD	11								1					C33
		77													
035	CUYAHOGA	11								1					C35
		61													
		73													
		77													
037	DARKE	77													C37
039	DEFIANCE	11								1					C39
		77													
041	DELAWARE	77								1					C41
043	ERIE	11								1					C43
		61													
		73													
		77													
045	FAIRFIELD	77													C45
047	FAYETTE	77													C47
049	FRANKLIN	77								1					C49
051	FULTON	11								1					C51
		77													
053	GALLIA	77	2												C53
055	GEAUGA	11								1					C55
		77													
057	GREENE	77													C57

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=39 STATE=OHIO

FIPS_CC	COUNTY	IRP	COAL	CU	G_P	AU	FE	MO	NI	O_S	PHAT	P	AG	U	FIPS_CC
059	GUERNSEY	77	3												C59
061	HAMILTON	99													C61
		77													
063	HANCOCK	11													C63
		77													
065	HARDIN	11													C65
		77													
067	HARRISON	77	3												C67
069	HENRY	11								1					C69
		77													
071	HIGHLAND	77								1					C71
073	HOCKING	77	2												C73
075	HOLMES	77	2												C75
077	HURON	11								1					C77
		77													
079	JACKSON	77	2												C79
081	JEFFERSON	77	3												C81
083	KNOX	77								1					C83
085	LAKE	11													C85
		61													
		73													
		77													
087	LAWRENCE	77	2												C87
089	LICKING	77													C89
091	LOGAN	77								1					C91
093	LORAIN	11								1					C93
		61													
		73													
		77													
095	LUCAS	11								1					C95
		61													
		73													
		77													
097	MADISON	77													C97
099	MAHONING	77	2												C99
101	MARION	77								1					101
103	MEDINA	11													103
		77													
105	MEIGS	77	2												105
107	MERCER	11													107
		77													
109	MIAMI	77													109
111	MONROE	77	2				X								111
113	MONTGOMERY	77													113
115	MORGAN	77	2												115
117	MORROW	77								1					117
119	MUSKINGUM	77	2												119
121	NOBLE	77	2												121
123	OTTAWA	61													123
		73													
		77													
125	PAULDING	11													125
		77													
127	PERRY	77	2												127
129	PICKAWAY	77								1					129
131	PIKE	77								1					131
133	PORTAGE	11													133
		77													
135	PREBLE	77													135
137	PUTNAM	11													137
		77													
139	RICHLAND	11													139
		77													
141	ROSS	77								1					141
143	SANDUSKY	11													143
		73													
		77													
145	SCIOTO	65	1							1					145
		77													
147	SENECA	11													147
		77													
149	SHELBY	11													149
		77													
151	STARK	11	2												151
		77													
153	SUMMIT	11								1					153
		77													
155	TRUMBULL	11								1					155
		77													
157	TUSCARAWAS	77	3												157
159	UNION	77													159
161	VAN WERT	11													161
		77													
163	VINTON	77	2												163
165	WARREN	77													165
167	WASHINGTON	77	2				X								167
169	WAYNE	77	1												169
171	WILLIAMS	11								1					171
		77													
173	WOOD	11													173
		77													
175	WYANDOT	11													175

APPENDIX C (CONTINUED)

---------- FIPS STATE NUMBER=39 STATE=OHIO ----------

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
		77													

---------- FIPS STATE NUMBER=40 STATE=OKLAHOMA ----------

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	ADAIR	19								1					001
003	ALFALFA	19													003
005	ATOKA	19	2												005
007	BEAVER	19													007
		59													
009	BECKHAM	19													009
		59													
011	BLAINE	19													011
013	BRYAN	19													013
015	CADDO	19													015
017	CANADIAN	19													017
019	CARTER	19								1					019
021	CHEROKEE	19								1					021
023	CHOCTAW	19													023
025	CIMARRON	19													025
		59													
027	CLEVELAND	19													027
029	COAL	19	2							1					029
031	COMANCHE	19					X								031
033	COTTON	19													033
035	CRAIG	19	2												035
037	CREEK	19													037
039	CUSTER	19													039
		59													
041	DELAWARE	19								1					041
043	DEWEY	19													043
		59													
045	ELLIS	19													045
		59													
047	GARFIELD	19													047
049	GARVIN	19													049
051	GRADY	19													051
053	GRANT	19													053
055	GREER	19		X											055
		59													
057	HARMON	19													057
		59													
059	HARPER	19													059
		59													
061	HASKELL	19	2												061
063	HUGHES	19													063
065	JACKSON	19		X											065
		59													
067	JEFFERSON	19													067
069	JOHNSTON	19								1					069
071	KAY	19													071
073	KINGFISHER	19													073
075	KIOWA	19													075
077	LATIMER	19	2												077
079	LE FLORE	19	2												079
081	LINCOLN	19													081
083	LOGAN	19													083
085	LOVE	19													085
087	MCCLAIN	19													087
089	MCCURTAIN	19													089
091	MCINTOSH	19	1												091
093	MAJOR	19													093
095	MARSHALL	19													095
097	MAYES	19								1					097
099	MURRAY	19					X			1					099
101	MUSKOGEE	19	1												101
103	NOBLE	19													103
105	NOWATA	19	2												105
107	OKFUSKEE	19	1												107
109	OKLAHOMA	19													109
111	OKMULGEE	19	2												111
113	OSAGE	19													113
115	OTTAWA	19													115
117	PAWNEE	19													117
119	PAYNE	19													119
121	PITTSBURG	19	2												121
123	PONTOTOC	19					X			1					123
125	POTTAWATOMIE	19													125
127	PUSHMATAHA	19													127
129	ROGER MILLS	19													129
		59													
131	ROGERS	19	2												131
133	SEMINOLE	19													133
135	SEQUOYAH	19	1							1					135
137	STEPHENS	19													137
139	TEXAS	19													139
		59													
141	TILLMAN	19													141
143	TULSA	19	1												143
145	WAGONER	19	1												145

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=40 STATE=OKLAHOMA

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
147	WASHINGTON	19													147
149	WASHITA	19													149
151	WOODS	19													151
		59													
153	WOODWARD	19													153
		59													

FIPS STATE NUMBER=41 STATE=OREGON

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	BAKER	1		X	2	X							X		C01
003	BENTON														C03
005	CLACKAMAS				2										C05
007	CLATSOP	31													C07
009	COLUMBIA						X								C09
011	COOS	31	1				X								C11
013	CROOK	1													C13
015	CURRY	18							X						C15
		31													
017	DESCHUTES				1										C17
019	DOUGLAS	31			2				X				X		C19
021	GILLIAM	1													C21
023	GRANT	1			2	X							X		C23
025	HARNEY	58			1										C25
027	HOOD RIVER	1			2										C27
029	JACKSON	18				X			X						C29
031	JEFFERSON	1			2								X		C31
033	JOSEPHINE			X		X			X						C33
035	KLAMATH	18			2										C35
		35													
037	LAKE	18			1									X	C37
039	LANE	31			2	X							X		C39
041	LINCOLN	31													C41
043	LINN														C43
045	MALHEUR				1	X								X	C45
047	MARION				2										C47
049	MORROW	1													C49
051	MULTNOMAH														C51
053	POLK														C53
055	SHERMAN	1													C55
057	TILLAMOOK	31													C57
059	UMATILLA	1			3										C59
061	UNION	1			2										C61
063	WALLOWA	1													C63
065	WASCO	1			2										C65
067	WASHINGTON														C67
069	WHEELER	1													C69
071	YAMHILL														C71

FIPS STATE NUMBER=42 STATE=PENNSYLVANIA

FIPS_CO	COUNTY	IPP	COAL	CU	G_T	AU	FE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ADAMS	51													C0
		76													
003	ALLEGHENY	76	2												C03
005	ARMSTRONG	76	3												C05
007	BEAVER	76	2												C07
009	BEDFORD	51	2		1		X								C09
		76													
011	BERKS	14		X		X	X						X		C11
		51													
		76													
013	BLAIR	51	2		1		X								C13
		76													
015	BRADFORD	51	2		1										C15
		76													
017	BUCKS	51													C17
		76													
019	BUTLER	76	1				X								C19
021	CAMBRIA	51	3		1										C21
		76													
023	CAMERON	76	2		1										C23
025	CARBON	51	2												C25
		76													
027	CENTRE	51	2				X								C27
		76													
029	CHESTER	51													C29
		76													
031	CLARION	76	2												C31
033	CLEARFIELD	51	3		1										C33
		76													
035	CLINTON	18	2		1										035
		51													
		76													
037	COLUMBIA	51	3												C37
		76													
039	CRAWFORD	11													C39
		76													

APPENDIX C (CONTINUED)

---------- FIPS STATE NUMBER=42 STATE=PENNSYLVANIA ----------

FIPS_CC	COUNTY	IDP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
041	CUMBERLAND	51													041
		76													
043	DAUPHIN	51	2												043
		76													
045	DELAWARE	51													045
		76													
047	ELK	76	2		1										047
049	ERIE	11													049
		76													
051	FAYETTE	76	1		1		X								051
053	FOREST	76													053
055	FRANKLIN	51													055
		76													
057	FULTON	51	2												057
		76													
059	GREENE	76	1												059
061	HUNTINGDON	51	2												061
		76													
063	INDIANA	76	1		1										063
065	JEFFERSON	76	2		1										065
067	JUNIATA	51					X								067
		76													
069	LACKAWANNA	51	2												069
		76													
071	LANCASTER	14		X					X						071
		51													
		76													
073	LAWRENCE	76	2												073
075	LEBANON	14	2	X		X	X						X		075
		51													
		76													
077	LEHIGH	51					X								077
		76													
079	LUZERNE	14	2												079
		51													
		76													
081	LYCOMING	14	2		1										081
		51													
		76													
083	MCKEAN	76	2												083
085	MERCER	76	2												085
087	MIFFLIN	51													087
		76													
089	MONROE	51													089
		76													
091	MONTGOMERY	51													091
		76													
093	MONTOUR	14													093
		51													
		76													
095	NORTHAMPTON	51													095
		76													
097	NORTHUMBERLAND	14	2												097
		51													
		76													
099	PERRY	51													099
		76													
101	PHILADELPHIA	51													101
		76													
103	PIKE	51													103
		76													
105	POTTER	11			1										105
		51													
		76													
107	SCHUYLKILL	14	3												107
		51													
		76													
109	SNYDER	51													109
		76													
111	SOMERSET	51	3		1										111
		76													
113	SULLIVAN	51	2		1										113
		76													
115	SUSQUEHANNA	14			1										115
		51													
		76													
117	TIOGA	51	2		1										117
		76													
119	UNION	14													119
		51													
		76													
121	VENANGO	76	2												121
123	WARREN	76													123
125	WASHINGTON	76	3												125
127	WAYNE	51	1												127
		76													
129	WESTMORELAND	76	2		1										129
131	WYOMING	14			1										131
		51													
		76													
133	YORK	51					X								133
		76													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=44 STATE=RHODE ISLAND

FIPS_CO	COUNTY	IMP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	BRISTOL	36													C01
003	KENT	36													C03
005	NEWPORT	26													C05
		36													
007	PROVIDENCE	36					I								C07
009	WASHINGTON	26													C09
		26													
		36													

FIPS STATE NUMBER=45 STATE=SOUTH CAROLINA

FIPS_CO	COUNTY	IMP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ABBEVILLE														C01
003	AIKEN														C03
005	ALLENDALE	49			1										C05
		55													
007	ANDERSON														C07
009	BAMBERG	49			1										C09
011	BARNWELL	55			1										C11
013	BEAUFORT	26			1						2				C13
		29													
		32													
		38													
		55													
015	BERKELEY	29			1						2				C15
		32													
		38													
		49													
017	CALHOUN				1										C17
019	CHARLESTON	26			1						2				C19
		29													
		32													
		38													
		49													
021	CHEROKEE														C21
023	CHESTER														C23
025	CHESTERFIELD	49				I									C25
027	CLARENDON	49													C27
029	COLLETON	26			1						2				C29
		29													
		32													
		38													
		49													
031	DARLINGTON	49													C31
033	DILLON	49													C33
035	DORCHESTER	29			1						2				C35
		32													
		49													
037	EDGEFIELD														C37
039	FAIRFIELD														C39
041	FLORENCE	49													C41
043	GEORGETOWN	26			1						2				C43
		29													
		32													
		38													
		49													
045	GREENVILLE														C45
047	GREENWOOD														C47
049	HAMPTON	49			1						2				C49
		55													
051	HORRY	26			1						2				C51
		29													
		32													
		38													
		49													
053	JASPER	26									2				C53
		29													
		32													
		38													
		49													
		55													
055	KERSHAW														C55
057	LANCASTER					I		I							C57
059	LAURENS														C59
061	LEE														C61
063	LEXINGTON														C63
065	MCCORMICK					I									C65
067	MARION	49			1						2				C67
069	MARLBORO	49													C69
071	NEWBERRY														C71
073	OCONEE														C73
075	ORANGEBURG	49			1										C75
077	PICKENS														C77
079	RICHLAND														C79
081	SALUDA														C81
083	SPARTANBURG														C83
085	SUMTER	49													C85
087	UNION														C87
089	WILLIAMSBURG	49													C89
091	YORK														C91

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=46 STATE=SOUTH DAKOTA

FIPS_CO	COUNTY	IPP	COAL	CU	O_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
003	AURORA	6													003
		70													
005	BEADLE	6													C05
		70													
007	BENNETT	6													C07
		52													
009	BON HOMME	6													C09
		70													
011	BROOKINGS	6													C11
013	BROWN	6													C13
		70													
015	BRULE	6													C15
017	BUFFALO	6													017
019	BUTTE	6												X	C19
		25													
021	CAMPBELL	6													C21
023	CHARLES MIX	6													023
025	CLARK	6													C25
		70													
027	CLAY	6													C27
029	CODINGTON	6													C29
031	CORSON	6	2												C31
033	CUSTER	6												X	C33
035	DAVISON	6													035
		70													
037	DAY	6													C37
		70													
039	DEUEL	6													C39
041	DEWEY	6	2												C41
043	DOUGLAS	6													C43
		70													
045	EDMUNDS	6													045
		70													
047	FALL RIVER	6						X						X	047
049	FAULK	6													C49
		70													
051	GRANT	6													051
053	GUNDORY	6			1										C53
055	HAAKON	6													055
057	HAMLIN	6													057
059	HAND	6													C59
		70													
061	HANSON	6													C61
		70													
063	HARDING	6	2					X						X	C63
		25													
065	HUGHES	6													065
067	HUTCHINSON	6													C67
		70													
069	HYDE	6													C69
		70													
071	JACKSON	6													C71
073	JERAULD	6													C73
		70													
075	JONES	6			1										C75
077	KINGSBURY	6													C77
		70													
079	LAKE	6													C79
081	LAWRENCE	6				X	X						X	X	C81
083	LINCOLN	6													C83
085	LYMAN	6			1										C85
087	MCCOOK	6													C87
		70													
089	MCPHERSON	6													C89
		70													
091	MARSHALL	6													C91
		70													
093	MEADE	6												X	C93
095	MELLETTE	6													C95
097	MINER	6													C97
		70													
099	MINNEHAHA	6													C99
101	MOODY	6													101
103	PENNINGTON	6				X	X	X						X	103
105	PERKINS	6	2											X	105
		25													
107	POTTER	6													107
		70													
109	ROBERTS	6													109
111	SANBORN	6													111
		70													
113	SHANNON	6													113
		52													
115	SPINK	6													115
		70													
117	STANLEY	6													117
119	SULLY	6													119
		70													
121	TODD	6													121
		52													
123	TRIPP	6													123
125	TURNER	6													125

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=46 STATE=SOUTH DAKOTA

FIPS_CO	COUNTY	IMP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		70													
127	UNION	6													127
129	WALWORTH	6													129
131	YANKTON	6													131
135	ZIEBACH	6													135
		70													
137		6	1												137

FIPS STATE NUMBER=47 STATE=TENNESSEE

FIPS_CO	COUNTY	IMP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ANDERSON	66	2							1					C01
		65													
003	BEDFORD	66													C03
005	BENTON	66								1					C05
007	BLEDSOE	66	2							1					C07
		65													
009	BLOUNT	66								1					C09
		65													
011	BRADLEY	66													C11
		65													
013	CAMPBELL	66	2							1					C13
		65													
015	CANNON	66								1					C15
017	CARROLL	5													C17
		66													
019	CARTER														C19
021	CHEATHAM	66								1					C21
023	CHESTER	5													C23
		66													
025	CLAIBORNE	66	2				X			1					C25
		65													
027	CLAY	66								1					C27
029	COCKE	66													C29
		65													
031	COFFEE	66								1					C31
033	CROCKETT	5													C33
035	CUMBERLAND	66	2				X								C35
		65													
037	DAVIDSON	66								1					C37
039	DECATUR	66								1					C39
041	DE KALB	66								1					C41
043	DICKSON	66													C43
045	DYER	5													C45
047	FAYETTE	5													C47
049	FENTRESS	66	2												C49
		65													
051	FRANKLIN	66								1					C51
053	GIBSON	5													C53
055	GILES	66								1		X			C55
057	GRAINGER	66								1					C57
		65													
059	GREENE	66													C59
		65													
061	GRUNDY	66	1												C61
063	HANCOCK	66													C63
		65													
065	HAMILTON	66	2				X			1					C65
		65													
067	HARDEMAN	65								1					C67
069	HARDIN	5													C69
071	HARDIN	66								1					C71
073	HAWKINS	65								1					C73
075	HAYWOOD	5													C75
077	HENDERSON	5													C77
		66													
079	HENRY	5													C79
		66													
081	HICKMAN	66										X			C81
083	HOUSTON	66													C83
085	HUMPHREYS	66													C85
087	JACKSON	66								1					C87
089	JEFFERSON	66													C89
		65													
091	JOHNSON														C91
093	KNOX	66													C93
		65													
095	LAKE	5													C95
097	LAUDERDALE	5	0												C97
099	LAWRENCE	66								1					C99
101	LEWIS	66								1					101
103	LINCOLN	66								1					103
105	LOUDON	66													105
		65													
107	MCNAIRY	66													107
		65													
109	MCMINN	5													109
		66													
111	MACON	66								1					111
113	MADISON	5													113

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=47 STATE=TENNESSEE

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	SB	U	FIPS_CC
		88													
115	RADION	88	2				X			1					115
		65													
117	RANDOLL	88													117
119	RANDY	88								1		X			119
121	REYES	88					X								121
		65													
123	ROBSON	88								1					123
		65													
125	ROBTGOMERY	88													125
127	ROONE	88								1					127
129	RORGAN	88	2												129
		65													
131	ORION	5													131
		88													
133	OVERTON	88	2							1					133
135	PERRY	88								1					135
137	PICKETT	88	1												137
		65													
139	POLK	88		X		X	X						X		139
		65													
141	PUTNAM	88	2							1					141
143	REEA	88	2				X			1					143
		65													
145	ROANE	88	1				X			1					145
		65													
147	ROBERTSON	88													147
149	RUTHERFORD	88													149
151	SCOTT	88	2												151
		65													
153	SEQUATCHIE	88	2							1					153
		65													
155	SEVIER	88					X								155
		65													
157	SHELBY	5	*												157
159	SMITH	88													159
161	STEWART	88					X								161
163	SULLIVAN	65													163
165	SUMNER	88								1					165
167	TIPTON	5	*												167
169	TROUSDALE	88													169
171	UNICOI														171
173	UNION	88													173
		65													
175	VAN BUREN	88	2												175
177	WARREN	88													177
179	WASHINGTON	65													179
181	WAYNE	88					X			1					181
183	WEAKLEY	5													183
185	WHITE	88	2							1					185
187	WILLIAMSON	88								1		X			187
189	WILSON	88													189

FIPS STATE NUMBER=48 STATE=TEXAS

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	SB	U	FIPS_CC
001	ANDERSON		2												C01
003	ANDREWS														003
005	ANGELINA		2												005
007	ARANSAS	4													C07
		24													
009	ARCHER														C09
011	ARMSTRONG	59													C11
013	ATASCOSA	67			1									X	C13
015	AUSTIN	19												X	C15
017	BAILEY	59													C17
019	BANDERA	19													C19
		67													
021	BASTROP	19	2		1										C21
		67													
023	BAYLOR														C23
025	BEE													X	C25
027	BELL	19			1										C27
		67													
029	BEXAR	67	2		1										C29
031	BLANCO	19													C31
		67													
033	BORDEN	59													C33
035	BOSQUE	19													C35
037	BOWIE	19	2												C37
039	BRAZORIA	4													C39
		24													
041	BRAZOS	19	2		1										C41
043	BREWSTER	57													043
		60													
		67													
045	BRISCOE	59													C45
047	BROOKS													X	C47
049	BROWN	19													C49
051	BURLESON	19	2		1										C51

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=48 STATE=TEXAS

FIPS_CO	COUNTY	IMP	COAL	CU	G_T	HU	FS	NO	NI	O_S	PEAT	P	AG	U	FIPS_CO
053	BURNET	19													
		67													C53
055	CALDWELL	19	2		1										
		67													C55
057	CALHOUN	4													
		26													C57
059	CALLAHAN	19													
061	CAMERON	4													C59
		21													C61
		26													
063	CAMP		2												
065	CARSON	59													C63
067	CASS		2				X								C65
069	CASTRO	59													C67
071	CHAMBERS	4													C69
		26													C71
073	CHEROKEE		2				X								
075	CHILDRESS	19													C73
		59													C75
077	CLAY	19													
079	COCHRAN	59													C77
081	COKE	19													C79
083	COLEMAN	19													C81
085	COLLIN				1										C83
087	COLLINGSWORTH	19													C85
		59													C87
089	COLORADO														
091	COMAL	19			1									X	C89
		67													C91
093	COMANCHE	19													
095	CONCHO	19													C93
		67													C95
097	COOKE	19													
099	CORYELL	19													C97
101	COTTLE	59													C99
103	CRANE	57													101
		67													103
105	CROCKETT	57													
		67													105
107	CROSBY	59													
109	CULBERSON	57		X				X					X		107
111	DALLAM	59													109
113	DALLAS				1										111
115	DAWSON	59													113
117	DEAF SMITH	59													115
119	DELTA				1										117
121	DENTON														119
123	DE WITT														121
125	DICKENS	59												X	123
127	DIMMIT														125
129	DONLEY	59													127
131	DUVAL							X							129
133	EASTLAND	19												X	131
135	ECTOR														133
137	EDWARDS	19													135
		67													137
139	ELLIS	19			1										
141	EL PASO	57													139
143	ERATH	19													141
145	FALLS	19			1										143
147	FANNIN	19			1										145
149	FAYETTE	19	2		1										147
151	FISHER	19												X	149
153	FLOYD	59													151
155	FOARD														153
157	FORT BEND														155
159	FRANKLIN		2												157
161	FREESTONE	19	2		1										159
163	FRIO				1										161
165	GAINES	59													163
167	GALVESTON	4													165
		26													167
169	GARZA	59													
171	GILLESPIE	19													169
		67													171
173	GLASSCOCK														
175	GOLIAD														173
177	GONZALES	19			1									X	175
		67												X	177
179	GRAY	59													
181	GRAYSON	19													179
183	GREGG		2												181
185	GRIMES		2												183
187	GUADALUPE	67			1									X	185
189	HALE	59													187
191	HALL	59													189
193	HAMILTON	19													191
195	HANSFORD	19													193
		59													195
197	HARDEMAN	19													
		59													197
199	HARDIN														199

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=48 STATE=TEXAS

FIPS_CC	COUNTY	IRP	COAL	CU	G_T	HU	PI	NO	NE	O_S	PEAT	P	AS	U	FIPS_CO
201	HARRIS	6												X	201
203	HARRISON		2												203
205	HARTLEY	59													205
207	HASKELL														207
209	HAYS	19			1										209
		67													
211	HEMPHILL	19													211
		59													
213	HENDERSON		2		1										213
215	HIDALGO	29													215
217	HILL	19			1										217
219	HOCKLEY	59													219
221	HOOD	19													221
223	HOPKINS				1										223
225	HOUSTON		2												225
227	HOWARD														227
229	HUDSPETH	57													229
231	HUNT				1										231
233	HUTCHINSON	59													233
235	IRION														235
237	JACK														237
239	JACKSON	6												X	239
241	JASPER														241
243	JEFF DAVIS	57													243
		67													
245	JEFFERSON	6													245
		29													
		49													
247	JIM HOGG													X	247
249	JIM WELLS													X	249
251	JOHNSON	19													251
253	JONES	19													253
255	KARNES	67			1			X						X	255
257	KAUFMAN				1										257
259	KENDALL	19													259
		67													
261	KENEDY	29													261
263	KENT	59													263
265	KERR	19													265
		67													
267	KIMBLE	19													267
		67													
269	KING	59													269
271	KINNEY	67			1										271
273	KLEBERG	6													273
		29													
275	KNOX														275
277	LAMAR	19													277
279	LAMB	59													279
281	LAMPASAS	19													281
		67													
283	LA SALLE														283
285	LAVACA													X	285
287	LEE	19	2		1										287
289	LEON	19	2		1										289
291	LIBERTY	6												X	291
293	LIMESTONE	19			1										293
295	LIPSCOMB	19													295
		59													
297	LIVE OAK							X						X	297
299	LLANO	19													299
		67													
301	LOVING	57													301
303	LUBBOCK	59													303
305	LYNN	59													305
307	MCCULLOCH	19													307
		67													
309	MCLENNAN	19			1									X	309
311	MCMULLEN														311
313	MADISON	19	2												313
315	MARION		2				X								315
317	MARTIN														317
319	MASON	19													319
		67													
321	MATAGORDA	6													321
		29													
323	MAVERICK				1										323
325	MEDINA	67			1										325
327	MENARD	19													327
		58													
		67													
329	MIDLAND														329
331	MILAM	19	2		1										331
333	MILLS	19													333
335	MITCHELL														335
337	MONTAGUE	19													337
339	MONTGOMERY													X	339
341	MOORE	59													341
343	MORRIS		2												343
345	MOTLEY	59													345
347	NACOGDOCHES		2												347
349	NAVARRO	19			1										349

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=48 STATE=TEXAS

FIPS_CO	COUNTY	IND	COAL	CU	G_T	AU	PE	MO	HI	O_S	PEAT	P	AG	U	FIPS_CC
351	NEWTON	69													351
353	NOLAN	19													353
355	NUECES	6												X	355
		20													
357	OCHILTREE	19													357
		59													
359	OLDHAM	59													359
361	ORANGE	69													361
363	PALO PINTO	19													363
365	PANOLA		2												365
367	PARKER	19													367
369	PARMER	59													369
371	PECOS	57													371
		60													
		67													
373	POLK														373
375	POTTER	59													375
377	PRESIDIO	57											X		377
		67													
379	RAINS		2												379
381	RANDALL	59													381
383	REAGAN	67													383
385	REAL	19													385
		67													
387	RED RIVER	19													387
389	REEVES	57													389
		60													
		67													
391	REFUGIO	6												X	391
393	ROBERTS	59													393
395	ROBERTSON	19	2		1										395
397	ROCKWALL				1										397
399	RUNNELS	19													399
401	RUSK		2												401
403	SABINE	69													403
405	SAN AUGUSTINE														405
407	SAN JACINTO													X	407
409	SAN PATRICIO	6												X	409
411	SAN SABA	19													411
		67													
413	SCHLEICHER	19													413
		67													
415	SCURRY	59													415
417	SHACKELFORD	19													417
419	SHELBY		2												419
421	SHERMAN	19													421
		59													
423	SMITH						X								423
425	SOMERVELL	19													425
427	STARR	21												X	427
429	STEPHENS	19													429
431	STERLING														431
433	STONEWALL														433
435	SUTTON	19													435
		67													
437	SWISHER	59													437
439	TARRANT														439
441	TAYLOR	19													441
443	TERRELL	57													443
		67													
445	TERRY	59													445
447	THROCKMORTON														447
449	TITUS		2												449
451	TOM GREEN	19													451
453	TRAVIS	19			1										453
		67													
455	TRINITY		2												455
457	TYLER														457
459	UPSHUR														459
461	UPTON	57													461
		67													
463	UVALDE	67			1					2					463
465	VAL VERDE	57													465
		67													
467	VAN ZANDT		2												467
469	VICTORIA	6												X	469
471	WALKER		2											X	471
473	WALLER													X	473
475	WARD	57													475
		67													
477	WASHINGTON	19	2		1									X	477
479	WEBB													X	479
481	WHARTON													X	481
483	WHEELER	19													483
		59													
485	WICHITA	19													485
487	WILBARGER	19													487
489	WILLACY	6													489
		21													
		24													
491	WILLIAMSON	19			1										491
		67													

APPENDIX C (CONTINUED)

---------- FIPS STATE NUMBER=48 STATE=TEXAS ----------

FIPS_CO	COUNTY	IND	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
493	WILSON	67			1										493
495	WINKLER														495
497	WISE														497
499	WOOD		2												499
501	YOAKUM	59													501
503	YOUNG														503
505	ZAPATA	21												X	505
507	ZAVALA				1										507

---------- FIPS STATE NUMBER=49 STATE=UTAH ----------

FIPS_CO	COUNTY	IND	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	BEAVER			X	1	X		X					X	X	001
003	BOX ELDER	25		X	3								X		003
005	CACHE	25			3										005
007	CARBON	13	2							3					007
		25													
009	DAGGETT	13								1					009
		25													
011	DAVIS	25													011
013	DUCHESNE	13			3					3					013
		25													
015	EMERY	13	2							1				X	015
		25													
017	GARFIELD	13	1							2				X	017
		25													
019	GRAND	13								3				X	019
		25													
021	IRON	13	1		2	X	X						X	X	021
023	JUAB	25		X	2	X							X	X	023
025	KANE	13	3											X	025
		25													
027	MILLARD	25			3										027
029	MORGAN	25													029
031	PIUTE	13				X							X	X	031
		25													
033	RICH	25										X			033
035	SALT LAKE	25		X	3	X		X					X		035
037	SAN JUAN	13		X						3				X	037
		25													
039	SANPETE	13			3										039
		25													
041	SEVIER	13	2		1									X	041
		25													
043	SUMMIT	13								1					043
		25													
045	TOOELE	25		X	3	X							X		045
047	UINTAH	13	2	X	3					3		X	X		047
		25													
049	UTAH	13		X		X				1			X		049
		25													
051	WASATCH	13		X		X				1			X		051
		25													
053	WASHINGTON	13		X	2		X						X		053
055	WAYNE	13	2							2				X	055
		25													
057	WEBER	25			3										057

---------- FIPS STATE NUMBER=50 STATE=VERMONT ----------

FIPS_CO	COUNTY	IND	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	ADDISON	36													001
		76													
003	BENNINGTON	22													003
		36													
		76													
005	CALEDONIA	26													005
		36													
		76													
007	CHITTENDEN	36													007
		76													
009	ESSEX	26													009
		36													
		76													
011	FRANKLIN	36													011
		76													
013	GRAND ISLE	36													013
		76													
015	LAMOILLE	36													015
		76													
017	ORANGE	26		X									X		017
		36													
		76													
019	ORLEANS	36													019
		76													
021	RUTLAND	22						X							021
		26													
		36													

APPENDIX C (CONTINUED)

---------- FIPS STATE NUMBER=50 STATE=VERMONT ----------

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	HO	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		76													
023	WASHINGTON	36													C23
		76													
025	WINDHAM	22													C25
		36													
		36													
		76													
027	WINDSOR	26													C27
		36													
		76													

---------- FIPS STATE NUMBER=51 STATE=VIRGINIA ----------

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	HO	PE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ACCOMACK	16													C01
		26													
		27													
		51													
003	ALBEMARLE	51													C03
005	ALLEGHANY	16													C05
		51													
007	AMELIA	16													C07
		51													
009	AMHERST	16					I								C09
		51													
011	APPOMATTOX	51					I								C11
013	ARLINGTON	16													C13
		19													
		51													
		76													
015	AUGUSTA	16													C15
		51													
017	BATH	51													C17
019	BEDFORD	51					I								C19
021	BLAND														C21
023	BOTETOURT	16													C23
		51													
025	BRUNSWICK	51													C25
027	BUCHANAN		3												C27
029	BUCKINGHAM	16		I											C29
		51													
031	CAMPBELL	51													C31
033	CAROLINE	16													C33
		19													
		51													
035	CARROLL			I			I						I		C35
036	CHARLES CITY	16													C36
		19													
		27													
		51													
037	CHARLOTTE	51													C37
041	CHESTERFIELD	16													C41
		51													
043	CLARKE	16													C43
		51													
		76													
045	CLAIG	51													C45
047	COLPEPER	51													C47
		76													
049	CUMBERLAND	16													C49
		51													
051	DICKENSON	65	2												C51
053	DINWIDDIE	51													C53
057	ESSEX	16													C57
		19													
		27													
		51													
059	FAIRFAX	16													C59
		19													
		51													
		76													
061	FAUQUIER	51				I									C61
		76													
063	FLOYD			I											C63
065	FLUVANNA	51				I									C65
067	FRANKLIN	51													C67
069	FREDERICK	51													C69
		76													
071	GILES														C71
073	GLOUCESTER	16													C73
		19													
		27													
		51													
075	GOOCHLAND	51				I									C75
077	GRAYSON			I			I								C77
079	GREENE	51													C79
081	GREENSVILLE	51													C81
083	HALIFAX	51		I									I		C83
085	HANOVER	19													C85
		51													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=51 STATE=VIRGINIA

FIPS_CO	COUNTY	IMP	COAL	CO	G_T	AS	FE	MO	NI	O_S	PERT	P	SB	U	FIPS_CC
087	HENRICO	51													C87
089	HENRY														C89
091	HIGHLAND	51													C91
093	ISLE OF WIGHT	10													C93
		19													
		27													
		51													
095	JAMES CITY	10													C95
		19													
		27													
		51													
097	KING AND QUEEN	10													C97
		19													
		51													
099	KING GEORGE	10													C99
		19													
		27													
		51													
101	KING WILLIAM	10													101
		19													
		51													
103	LANCASTER	10													103
		19													
		27													
		51													
105	LEE	65	2				X								105
107	LOUDOUN	10													107
		51													
		76													
109	LOUISA	51		X		X							X		109
111	LUNENBURG	51													111
113	MADISON	51													113
115	MATHEWS	10													115
		19													
		27													
		51													
117	MECKLENBURG	51													117
119	MIDDLESEX	10													119
		19													
		27													
		51													
121	MONTGOMERY		2												121
125	NELSON	10													125
		51													
127	NEW KENT	10													127
		19													
		27													
		51													
131	NORTHAMPTON	10													131
		26													
		27													
		51													
133	NORTHUMBERLAND	10													133
		19													
		27													
		51													
135	NOTTOWAY	51													135
137	ORANGE	51				X									137
139	PAGE	51													139
		76													
141	PATRICK			X											141
143	PITTSYLVANIA	51													143
145	POWHATAN	51													145
147	PRINCE EDWARD	51													147
149	PRINCE GEORGE	10													149
		19													
		27													
		51													
153	PRINCE WILLIAM	10		X											153
		51													
		76													
155	PULASKI		2				X								155
157	RAPPAHANNOCK	51													157
		76													
159	RICHMOND	10													159
		19													
		27													
		51													
161	ROANOKE	51													161
163	ROCKBRIDGE	10					X								163
		51													
165	ROCKINGHAM	51													165
		76													
167	RUSSELL	65	2												167
169	SCOTT	65	2												169
171	SHENANDOAH	51													171
		76													
173	SMYTH						X								173
175	SOUTHAMPTON	51													175
177	SPOTSYLVANIA	10		X		X							X		177
		51													
179	STAFFORD	10													179

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=51 STATE=VIRGINIA

FIPS_CC	COUNTY	IPP	COAL	CU	G_T	HP	PI	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		51													
101	SURRY	16													101
		19													
		27													
		51													
103	SUSSEX	51													103
105	TAZEWELL		2												105
107	WARREN	51													107
		76													
191	WASHINGTON														191
193	WESTMORELAND	16													193
		19													
		27													
		51													
195	WISE	65	2				X								195
197	WYTHE						X						X		197
199	YORK	16													199
		19													
		27													
		51													
550	NORFOLK/CHESAPEAKE	16													550
		19													
		27													
		51													
650	HAMPTON	16													650
		19													
		27													
		51													
700	NEWPORT NEWS	16													700
		19													
		27													
		51													
800	SUFFOLK/NANSEMOND	16													800
		19													
		27													
		51													
810	VIRGINIA BEACH	16													810
		19													
		26													
		27													
		51													

FIPS STATE NUMBER=53 STATE=WASHINGTON

FIPS_CC	COUNTY	IPP	COAL	CU	G_T	HP	PI	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	ADAMS	1													C01
003	ASOTIN	1													C03
005	BENTON	1													C05
007	CHELAN	1		X		X	X	X	X				X		C07
		39													
009	CLALLAM	31			3										C09
		39													
011	CLARK														C11
013	COLUMBIA	1													C13
015	COWLITZ														C15
017	DOUGLAS	1													C17
019	FERRY			X		X		X	X				X		C19
021	FRANKLIN	1													C21
023	GARFIELD	1													C23
025	GRANT	1						X							C25
027	GRAYS HARBOR	31													C27
029	ISLAND	31													C29
		39													
031	JEFFERSON	31													C31
		39													
033	KING	31	2			X	X	X							C33
		39													
035	KITSAP	31													C35
		39													
037	KITTITAS	1	2			X	X	X	X						C37
		39													
039	KLICKITAT	1													C39
041	LEWIS	39	3		3			X							C41
043	LINCOLN							X							C43
045	MASON	31													C45
		39													
047	OKANOGAN	1		X		X	X	X					X		C47
		39													
049	PACIFIC	31													C49
051	PEND OREILLE						X	X					X	X	C51
053	PIERCE	31	2												C53
		39													
055	SAN JUAN	31													C55
		39													
057	SKAGIT	31					X	X							C57
		39													
059	SKAMANIA	1		X				X							C59
061	SNOHOMISH	31		X	1	X		X	X				X		C61
		39													
063	SPOKANE													X	C63

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=53 STATE=WASHINGTON

FIPS_CC	COUNTY	IRP	COAL	CU	G_T	AU	FE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
065	STEVENS			X		X	X	X					X	X	C65
067	THURSTON	31	2												C67
		39													
069	WAHKIAKUM														C69
071	WALLA WALLA	1			3										C71
073	WHATCOM	31	2		2	X	X	X							C73
		39													
075	WHITMAN	1													C75
077	YAKIMA	1			3			X							C77
		39													

FIPS STATE NUMBER=54 STATE=WEST VIRGINIA

FIPS_CC	COUNTY	IRP	COAL	CU	G_T	AU	FE	NO	NI	O_S	PEAT	P	AG	U	FIPS_CC
001	BARBOUR	76	3		1										C01
003	BERKELEY	14								1					C03
		51													
		76													
005	BOONE		3												C05
007	BRAXTON	76	2		1		X								C07
009	BROOKE	77	2												C09
011	CABELL	77	2												C11
013	CALHOUN		1												C13
015	CLAY		2												C15
017	DODDRIDGE		2												C17
019	FAYETTE		3		1										C19
021	GILMER		2												C21
023	GRANT	51	2				X			1					C23
		76													
025	GREENBRIER		2		1		X			1					C25
027	HAMPSHIRE	51								1					C27
		76													
029	HANCOCK	77	2												C29
031	HARDY	51								1					C31
		76													
033	HARRISON	76	2		1										C33
035	JACKSON	77													C35
037	JEFFERSON	14													C37
		51													
		76													
039	KANAWHA		3												C39
041	LEWIS	76	2		1		X								C41
043	LINCOLN		2												C43
045	LOGAN		3												C45
047	MCDOWELL		3												C47
049	MARION	76	3		1										C49
051	MARSHALL	77	3												C51
053	MASON	77	2												C53
055	MERCER		2							1					C55
057	MINERAL	51	2							1					C57
		76													
059	MINGO		3												C59
061	MONONGALIA	76	3		1										061
063	MONROE									1					C63
065	MORGAN	51								1					C65
		76													
067	NICHOLAS		3		1										C67
069	OHIO	77	2												C69
071	PENDLETON	51								1					C71
		76													
073	PLEASANTS	77													C73
075	POCAHONTAS	51	2		1		X			1					C75
		76													
077	PRESTON	76	2		1										C77
079	PUTNAM		2												C79
081	RALEIGH		3												C81
083	RANDOLPH	51	2		1					1					C83
		76													
085	RITCHIE														C85
087	ROANE		2												C87
089	SUMMERS		1												C89
091	TAYLOR	76	2		1		X								C91
093	TUCKER	51	2		1										C93
		76													
095	TYLER	77	2												C95
097	UPSHUR	76	2		1										C97
099	WAYNE	77	2												C99
101	WEBSTER	76	3		1										101
103	WETZEL	76	2												103
		77													
105	WIRT														105
107	WOOD	77													107
109	WYOMING		3												109

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=55 STATE=WISCONSIN

FIPS_CO	COUNTY	IRP	CORL	CU	G_T	AU	PE	NO	HI	O_S	PRAT	P	BG	S	FIPS_CC
001	ADAMS	11									1				C01
		30													
		71													
		77													
003	ASHLAND	11					X				2				C03
		73													
005	BARRON	30													C05
		71													
		77													
007	BATTFIELD	11									2				C07
		73													
009	BROWN	11									2				C09
		73													
011	BUFFALO	27													C11
		66													
		72													
		77													
013	BURNETT	30													C13
		71													
		77													
015	CALUMET	11									2				C15
		30													
		71													
		77													
017	CHIPPEWA	30													C17
		71													
		77													
019	CLARK	30													C19
		71													
		77													
021	COLUMBIA	11									2				C21
		30													
		71													
		77													
023	CRAWFORD	27													C23
		66													
		72													
		77													
025	DANE	30													C25
		71													
		77													
027	DODGE	30					X				2				C27
		71													
		77													
029	DOOR	11													C29
		73													
031	DOUGLAS	11													031
		30													
		73													
		77													
033	DUNN	30													C33
		71													
		77													
035	EAU CLAIRE	30													C35
		71													
		77													
037	FLORENCE	11					X								C37
039	FOND DU LAC	11									2				C39
		30													
		71													
		77													
041	FOREST	11		X		X					2		X		C41
043	GRANT	27													C43
		66													
		72													
		77													
045	GREEN	11													C45
		77													
047	GREEN LAKE	11									2				C47
		30													
		71													
		77													
049	IOWA	77													C49
051	IRON	11					X				2				C51
		73													
053	JACKSON	71					X				1				C53
		77													
055	JEFFERSON	30									2				C55
		71													
		77													
057	JUNEAU	30									1				C57
		71													
		77													
059	KENOSHA	11													C59
		30													
		73													
		77													
061	KEWAUNEE	11													C61
		73													
063	LA CROSSE	27													C63
		66													
		72													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=55 STATE=WISCONSIN

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CC
		77													
065	LAFAYETTE	77													C65
067	LANGLADE	11									2				C67
069	LINCOLN	77									2				C69
071	MANITOWOC	11													C71
		36													
		71													
		73													
		77													
073	MARATHON	11													C73
		36													
		71													
		77													
075	MARINETTE	11						X							C75
		73													
077	MARQUETTE	11									1				C77
		36													
		71													
		77													
078	MENOMINEE	11									2				C78
079	MILWAUKEE	11													C79
		36													
		73													
		77													
081	MONROE	77									2				C81
083	OCONTO	11									2				C83
		73													
085	ONEIDA	11		X		X					2		X		C85
087	OUTAGAMIE	11									2				C87
		36													
		77													
089	OZAUKEE	11													C89
		36													
		73													
		77													
091	PEPIN	66													C91
		72													
		77													
093	PIERCE	66													C93
		72													
		77													
095	POLK	36													C95
		71													
		77													
097	PORTAGE	11									1				C97
		36													
		71													
		77													
099	PRICE	77									2				C99
101	RACINE	11													101
		36													
		73													
		77													
103	RICHLAND	77													103
105	ROCK	71													105
		77													
107	RUSK	36		X							2		X		107
		71													
		77													
109	ST CROIX	36													109
		66													
		72													
		77													
111	SAUK	71					X				1				111
		77													
113	SAWYER	36									2				113
		71													
		77													
115	SHAWANO	11									2				115
117	SHEBOYGAN	11													117
		36													
		71													
		73													
		77													
119	TAYLOR	36									2				119
		71													
		77													
121	TREMPEALEAU	27													121
		66													
		72													
		77													
123	VERNON	27													123
		66													
		72													
		77													
125	VILAS	11									2				125
127	WALWORTH	36													127
		71													
		77													
129	WASHBURN	36													129
		71													
		77													

APPENDIX C (CONTINUED)

FIPS STATE NUMBER=55 STATE=WISCONSIN

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
131	WASHINGTON	11									2				131
		36													
		71													
		77													
133	WAUKESHA	11													133
		36													
		71													
		77													
135	WAUPACA	11									2				135
		36													
		77													
137	WAUSHARA	11									1				137
		36													
		71													
		77													
139	WINNEBAGO	11									2				139
		36													
		71													
		77													
141	WOOD	36									1				141
		71													
		77													

FIPS STATE NUMBER=56 STATE=WYOMING

FIPS_CO	COUNTY	IRP	COAL	CU	G_T	AU	FE	MO	NI	O_S	PEAT	P	AG	U	FIPS_CO
001	ALBANY	25	2	X		X	X							X	C01
003	BIG HORN	25	1											X	C03
		63													
005	CAMPBELL	25	3											X	C05
		63													
007	CARBON	13	3	X			X			1				X	C07
		25													
009	CONVERSE	25	3		3									X	C09
		63													
011	CROOK	6	1											X	C11
		25													
		63													
013	FREMONT	13	2		3	X	X							X	C13
		25													
		63													
015	GOSHEN	12												X	C15
		25													
017	HOT SPRINGS	25	2		3										C17
		63													
019	JOHNSON	25	3											X	C19
		63													
021	LARAMIE	25													C21
023	LINCOLN	13	3		2					1		X		X	C23
		25													
025	NATRONA	25	2											X	C25
		63													
027	NIOBRARA	6													C27
		25													
029	PARK	25	2	X		X		X							C29
		63													
031	PLATTE	25		X			X							X	C31
033	SHERIDAN	25	3												C33
		63													
035	SUBLETTE	13								1					C35
		25													
		63													
037	SWEETWATER	13	3							1				X	C37
		25													
039	TETON	25			1										C39
		63													
041	UINTA	13	2							1					C41
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043	WASHAKIE	25	2												C43
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15. Supplementary Notes
1:7,500,000-scale maps NOT included with this publication
Text material in this publication ONLY available through NTIS

16. Abstract (Limit: 200 words)

The atlas highlights areas in the conterminous US of potential concern involving coal and minerals development activities and fish and wildlife resources, in particular the Important Resource Problem Areas (IRPs) designated in 1980 by the US Fish and Wildlife Service as areas of emphasis in policymaking. The atlas serves as an initial screening tool for national and regional planners and administrators to help define areas that may require additional analysis prior to development in order to minimize disturbances and adverse impacts on fish and wildlife resources and to protect and enhance these resources where practicable.

The publication contains maps of selected mineral resources (coal, copper, geothermal resources, gold, iron, molybdenum, nickel, oil shale/tar sands, peat, phosphate, silver, uranium), IRPs, and Federal Endangered and Threatened Animal Species. An overlay of the IRP map is provided: by placing this on a mineral map, counties containing both mineral and wildlife resources will be highlighted. Background information on IRPs, the mineral commodities, and environmental impacts of mineral mining is provided, as well as appendices which tabulate the data displayed in the maps. The document can also be used with a series of 1:7,500,000-scale reproductions of the maps.

17. Document Analysis a. Descriptors coal, copper, geothermal, gold, iron, molybdenum, nickel, oil shale, tar sands, peat, phosphate, silver, uranium, endangered species, threatened species, Important Resource Problems, U.S. Fish and Wildlife Service

b. Identifiers/Open-Ended Terms mineral deposits, mineral resources, mining, environmental impacts, fish resources, wildlife resources, national planning, regional planning, natural resources

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18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
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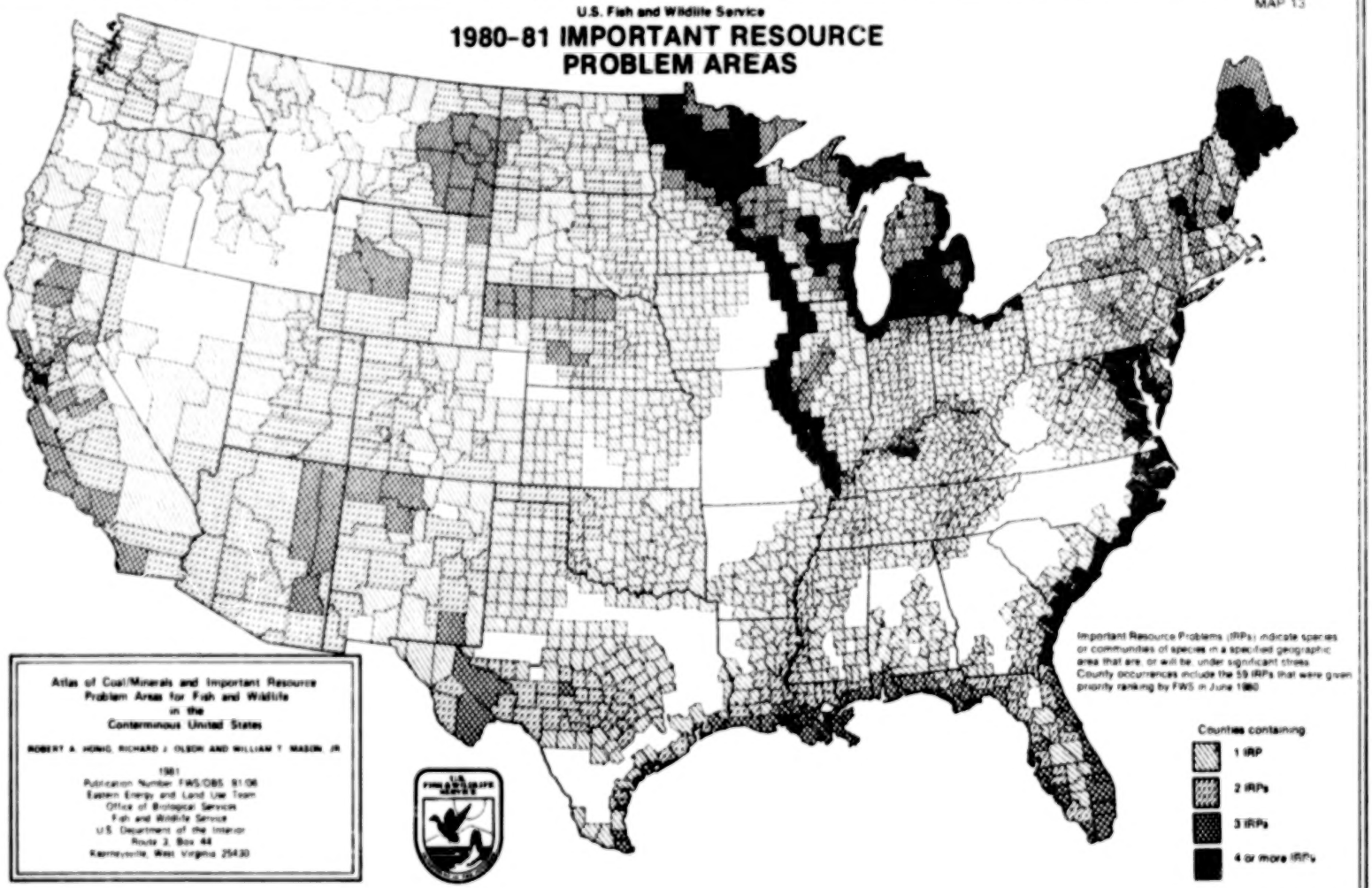
U.S. Fish and Wildlife Service

MAP 13

1980-81 IMPORTANT RESOURCE PROBLEM AREAS



Atlas of Coal/Minerals and Important Resource Problem Areas for Fish and Wildlife in the Conterminous United States

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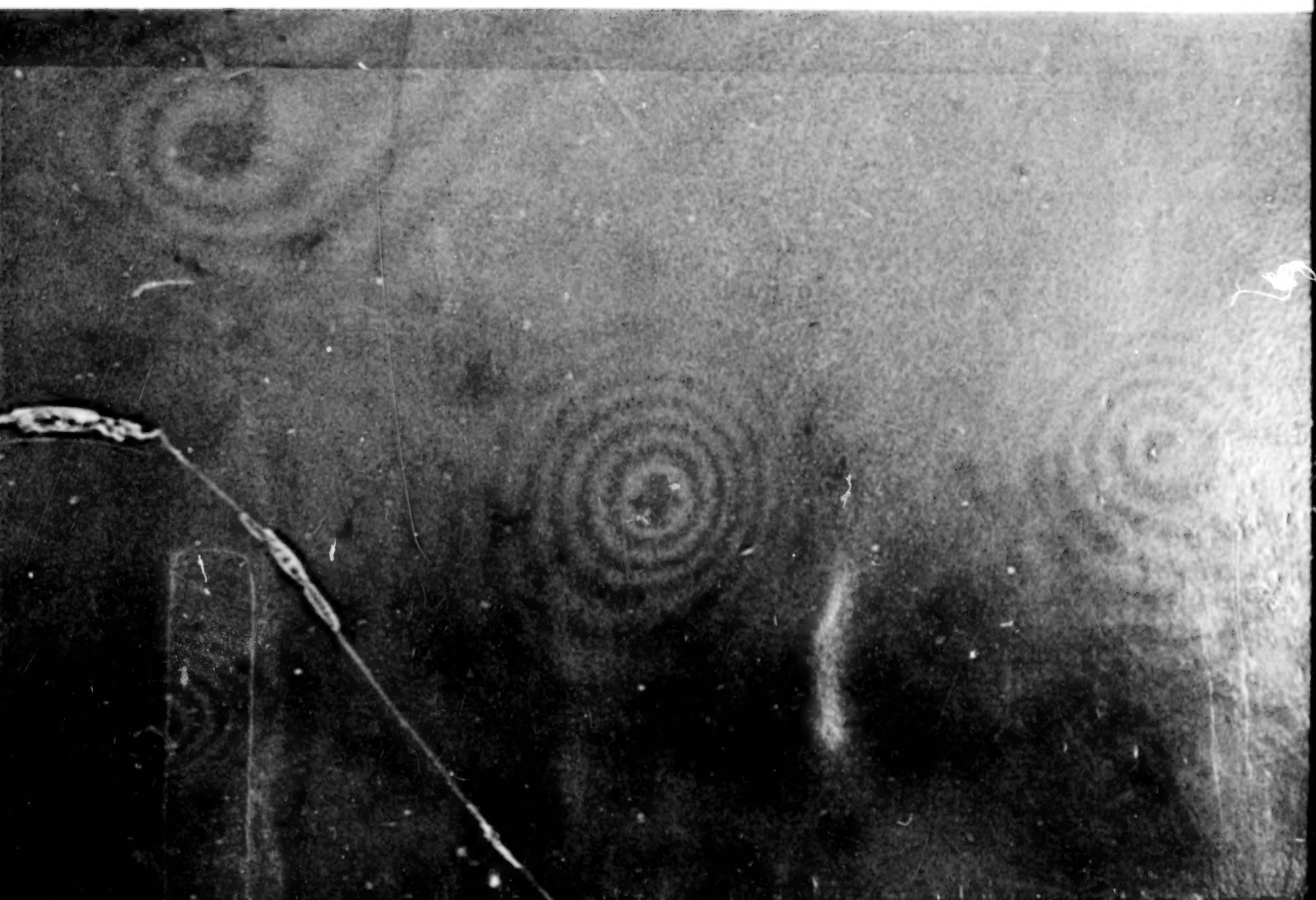

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